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Machines (M) ... Replace entire section.

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The format used throughout the "Machines" section of the manual has been designed to give the reader, in highlight form, as much information in as few words as possible. A change bar to the right of any entry indicates a change or addition. A study of the points covered in this typical machine description will show where and how various types of information are covered.

This manual contains information on machine types, models and features that are not announced in Canada. This information does not mean that the unannounced machine types, models and features will be announced in Canada.

Because not all information on unannounced machine types, models and features is highlighted by notations like "Except Canada" or "Japan Only", your IBM marketing representative should be contacted to confirm availability in Canada.

**Purpose** — a brief description of the machine's major functions.

**Models** — a brief description of major differences in available models.

**Highlights** — brief comments on functional operations.

**Limitation(s)** — only those which apply to the machine itself ... limitations for Special Features appear in "Special Features" descriptions.

**Prerequisite(s)** — other machines, special features, or "Specify" items required for installation of the machine ... usually related to system components.

**Bibliography** — base number only. Consult the current appropriate system bibliography for listing of all available manuals pertaining to the machine.

**Specify** — this section lists items which will be furnished at no additional charge when specified on initial machine order for plant installation at time of manufacture. Each item is identified by a name and a four-digit (9XXX or 8XXX) number preceded by a number sign (#). 9XXX or 8XXX numbers are also used as detailed specifications for certain special features listed in "Special Features" descriptions. For charges to field install, remove or change a Specify Feature on a purchased machine, contact IBM.

**Special Features** — listed here are descriptions of the special features which can be added to the base machine ... briefly describes the additional function(s) supplied by the feature.

**Installation** — there are three categories for installation of special features. Field Installable, Not Recommended for Field Installation, or Available at Time of Manufacture Only.

**Prerequisite(s)** — other machines, special features, or "Specify" items required for installation of the feature.

#### Terms and Conditions

**Plan Offering** — the plan under which the lease and rental machine is offered.

**Additional Use Charge** — for Plan "A" rental machines, the entry 10% or 30% indicates that hours of additional billable time are charged at an hourly rate of 1/176th of 10% or 30% of the MRC/MAC.

**Model Conversion/Feature Add'l Charge** — additional charge applies to rental features and model conversion upgrades installed on Plan "A" lease machines.

**Initial Period of Maintenance Service** — for Plan "D" lease and rental machines ... the number of months during which IBM provides 24 hour 7 days per week maintenance service at no additional charge.

**Non-field Installable Feat/Mdl Conversions** — indicates whether machine type has any features or model conversions that are classified as other than "Field Installable." See list of non-field installable special features/model conversions starting on page M 10 and see individual machine page.

**Customer Set-Up (CSU)** — customer set up allowance will be specified for each CSU machine.

**Repair Center Service** — warranty and maintenance service provided at an IBM Repair Center.

**Central Facility Maintenance Service** — warranty and maintenance service provided at customer's Central Facility.

**Deferred Central Facility Maintenance Service** — maintenance service option at customer's Central Facility.

**Upper Limit Percent** — applies to the price protection provisions for IBM lease machines.

**Termination Charge Percent/Months** — applies to termination of lease contract periods for installed lease machines.

**Processor Complex Unit** — IBM lease and rental processor complex units require 3 months discontinuance notice from customer.

**Purchase Option** — the percentage of the monthly lease and rental charges which is credited against the purchase price when a customer purchases an installed machine. See "Purchase Plans" in GI section for limitations and additional information.

**Base Term** — length of lease contract period for lease machines.

**Educational Allowance**

**Testing Allowance (Pre-Installation)**

**Pilot Test Plan** — machine eligibility for pilot test plan.

**Warranty** — Category "A" is 12 months — Category "B" is 3 months warranty.

**Machine Group** — indicates the machine group to be used when calculating the additional charge for maintenance for optional periods of maintenance service availability for purchased maintenance agreement service machines and Plan "D" lease and rental machines.

**Per Call** — the class of rates applicable to a machine when it is subject to hourly service charges.

**Metering** — indicates the type of meter on a Plan Offering "A" machine.

**Model Conversions** — there are three categories: Field Installable, Not Recommended for Field Installation, or Available at Time of Manufacture Only.

## 1255 - MAGNETIC CHARACTER READER

### PURPOSE

Sorts documents, used in banking and other applications, meeting specifications under "Highlights" below. Available as a stand-alone sorter, or with an appropriate attachment feature, reads magnetic character data into a System/3 model 6, 8, 10, 12 or 15, a System/32, a System/34, a System/36 into a 2770 system in home or line mode, into a S/360 model 22, 25, 30, 40, 50, a S/370 model 115 through 158, 3031 Processor, or 4300 processor.

### MODELS

- Model 001 (NO LONGER AVAILABLE): Reads and/or sorts up to 500 6-inch documents per minute into six stackers.
- Model 002 (NO LONGER AVAILABLE): Reads and/or sorts up to 750 6-inch documents per minute into six stackers.
- Model 003: Reads and/or sorts up to 750 6-inch documents per minute into 12 stackers.
- Model 021 (NO LONGER AVAILABLE): Reads and/or sorts up to 500 6-inch documents per minute into six stackers.
- Model 022 (NO LONGER AVAILABLE): Reads and/or sorts up to 750 6-inch documents per minute into six stackers.

Model 023: Reads and/or sorts up to 750 6-inch documents per minute into 12 stackers.

Mdls 1, 2 and 3 read the E13B type font. The characters, print quality, and codeline arrangement must meet, or be equivalent to, the recommendation of one of the following national associations of bankers: The Committee of London Clearing Banks - Requirements for Automatic Check Handling; The Canadian Bankers Association - Cheque Standards and Specification for Magnetic Ink Encoding; Australian Bank's Automation Research Committee - The Common Machine Language.

The 1255 mdls 21, 22 and 23 are similar to mdls 1, 2 and 3 and read magnetic character data into a System/3 mdl 10, 12 or 15, S/360 mdl 22, 25, 30, 40, 50, a 370 mdl 115 through 158, a 3031 Processor, or a 4300 processor.

Mdls 21, 22 and 23 read the CMC7 type font (coded magnetic characters with seven bars). The characters and print quality must meet the specifications recommended by ECMA (European Computer Manufacturers Association) or ISO (International Standards Organization). The codeline is flexible (see "Specify" below).

**Prerequisites:** For 1255 -- all documents must be mechanically jogged prior to each pass through the machine -- jiggers are available from commercial sources. A sorting tray is recommended.

For System/3 -- one 1255 mdl 1, 2, 3 can be attached to a mdl 6. One 1255 mdl 4, 2, 3, 21, 22 or 23 can be attached to a mdl 8, 10, 12 or 15. Serial I/O Channel (#7081) is required on the 5406, 5408, 5410, 5412 or 5415 -- System/3/32/34 Adapter (#6303) is required on the 1255 itself. See "Special Features" for additional information, also see "Specify". Limitations: The 1255 utility program (5702-UT2 for both the mdl 8 and mdl 10 disk systems, and 5703-UT2 for the mdl 6) requires at least 12K bytes of main storage. The 1255 support for the mdl 12 and mdl 15 requires a minimum system. IBM's ability to service a mdl 10 card system with a 1255 attached may be impaired with an effect on system availability.

For System/32 -- one 1255 mdls 1, 2 or 3 can be attached. System/3/32/34 Adapter (#6303) is required on the 1255. 1255 Attachment (#1100) is required on the 5320. See "Special Features" for additional information, also see "Specify".

For System/34 -- one 1255 mdl 1, 2 or 3 System/3/32/34 Adapter (#6303) is required on the 1255. 1255 Attachment (#1100) is required

on the 5340. See "Special Features" for additional information, also see "Specify".

For System/36 -- one 1255 mdls 1, 2 or 3 System/3/32/34 Adapter (#6303) is required on the 1255. 1255 Attachment (#1100) is required on the 5360. See "Special Features" for additional information, also see "Specify". For 2770 -- one 1255 can be attached to a 2770 system. 1255 Attachment (#9755) and Buffer Expansion (#1490) are required on the 2772 -- 2772 Adapter (#7850) is required on the 1255 itself. See "Special Features". For audit, maintenance, error recovery and application procedures, the 2770 system must include a printer.

For S/360 mdl 22, 30, 40, 50, or S/370 mdl 115 through 158, 3031 Processor, or a 4300 processor -- one 1255 can be attached to a system -- requires a channel control unit position -- a byte multiplexer channel is recommended. The 1255 should normally be the highest priority device on the channel. S/360/370 Adapter (#6360) is required on the 1255 -- see "Special Features". Direct Control (#3274) or External Interrupt (#3895) is required on the processing unit. There are no special features required on the 4361 or 4381 Processor to attach the 1255. External Signal (#3898) is required on the 3115, 3125 and the 4331 Processor. RPQ SU0044 is required on the 3115 Byte Multiplexer Channel (#5248).

S/360 mdl 25 -- multiplexer channel (special feature), or selector channel (special feature).

S/360 mdl 22, 30, 40, 50 -- multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).

S/370 mdl 115, 125 -- byte multiplexer channel (special feature), External Signal (#3898) -- see M3115, 3125 pages. On a 3115-0, #9336 is required.

S/370 mdl 135 -- multiplexer channel (standard), selector channels (special features) -- M3135 pages.

S/370 mdl 135-3 -- byte multiplexer channel (standard), block multiplexer channels (special feature) -- see M3135-3 pages.

S/370 mdl 138 -- byte multiplexer channel (standard), block multiplexer channels (standard) -- see M3138 pages.

S/370 mdl 145 -- multiplexer channel (standard), selector channels -- see M3145 pages.

S/370 mdl 145-3 -- byte multiplexer channel (standard), block multiplexer channels -- see M3145-3 pages.

S/370 mdl 148 -- byte multiplexer channel (standard), block multiplexer channels (standard) -- see M3148 pages.

S/370 mdl 155, 158 -- multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) -- see M3155, 3158 pages.

3031 Processor -- byte multiplexer channel (one is standard), block multiplexer channels (five are standard) -- see M3031 pages.

4300 processor -- byte multiplexer channel, block multiplexer channel.

**Limitations:** For S/360, S/370 or 4300 Processors -- the 1255 is not supported by any 1400 or 7000 series compatibility features. The 1255 is not supported by the Mdl 20 Compatibility Feature (#7520) on the 3115, 3125.

### HIGHLIGHTS

Actual sorting and processing speeds depend on length of document, paper quality, atmospheric conditions, and/or 2772 terminal and transmission limitations, or host system limitations. Reads all fields and sorts on any field.

Uses a lower cost, single-gap MICR reading technique, providing MICR capabilities for smaller volume operations. Reading performance may differ from other reader sorters. Pre-installation runs of actual documents are strongly recommended to determine expected performance. The input hopper holds 139.7mm (5-1/2") of documents in a gravity feed, permitting non-stop feeding. Mdl's 1, 2, 21 and 22 each have six horizontal stackers in one vertical bay, while mdl's 3 and 23 have 12 horizontal stackers arranged in two vertical bays of six stackers each. Individual stackers have a document capacity of 63.5mm (2-1/2"). The transport mechanism opens for access to the document path. An operator-resettable document counter is provided.

The unit is designed for ease of operation and operator training. The operator panel, feed hopper and stackers are in a compact area for operator convenience and minimum space requirements.

In addition to performing the basic Modulus 10 or 11 checking function, the Self-Checking Number/Improved Recognition feature, when installed and operative, is integrated with the MICR reading circuitry to reduce account number rejects and substitutions. This field is especially subject to folds, banding, and print specification deviations. Rejects and character substitutions will be reduced in proportion to the severity of document degradations, thus reducing customer reconciliation expense.

**Sorting:** For mdl's 1, 2, 21 and 22, offline sorting uses five sort stackers and one reject stacker for a 2-phase digital sort. Phase 1 sorts even digits, rejecting odd digits which are sorted in phase 2. This conforms to the sort pattern of other 6-stacker sorters and permits the start of phase 2 sorting without removing phase 1 documents from the stacker. If Alternate Sort Pattern (#9301) is specified, digits 0-4 sort in phase 1 and digits 5-9 sort in phase 2.

For mdl's 3 and 23, 1-phase sorting on digits 0-9 with rejects directed to stacker "R" at top of first bay. Stacker "A" at top of second bay is used to select items when the High Order Zero and Blank Column Selection feature is installed.

Online 2770 system operation suspends sorting, automatically alternating between two stackers on a stacker-full condition, with the rejecting of invalid documents.

Stacker selection is under program control when operating online to a computer system.

Mdl's 1, 2 and 3 can read/sort on up to ten positions in five fields. Mdl's 21, 22 and 23 can read/sort on up to twenty positions in seven fields.

**Field Lengths:** (Mdl's 1, 2, 3) The amount field and transit-routing (bank and branch) field are fixed-length -- the process control (transaction code) field and serial number (auxiliary on-us) field are variable-length -- the account number field may be fixed- or variable-length. See "Specify" below. For mdl's 21, 22 and 23, see "Specify" below.

**Checking:** Readability of each magnetic character and special symbol, and the field-length check on fixed-length fields, are checked on all fields designated by the operator for reading into the system or terminal in the online mode, or on all fields designated for checking in the offline mode. When attached to the 2770 system, error documents are automatically rejected by the 1255 and data is not transferred to the 2772 buffer.

**Documents:** Intermixed paper and card documents (including traveler's checks) within the following specifications can be processed:

Width -- 64 to 108mm (2.5" to 4.25")

Length -- 146 to 225mm (5.75" to 8.875")

Thickness -- 0.076 to 0.178mm (0.003" to 0.007")

Paper Stock -- 75 to 165g/sq.m (20 lb. to 44 lb) (card stock)

Carrier documents, enclosing a non-processable item, up to 0.33mm (0.013") in thickness may be processed.

**Document Evaluation:** Documents must be evaluated at least six months prior to installation to determine whether the level of print quality is acceptable to the customer, with time for corrective action if necessary. Sub-standard E13B quality may cause excessive rejects and character substitutions.

**Transmission:** When used with the 2770 system, the 1255 reads into the two 2772 buffers, automatically stopping and alternating between buffers on a specified number of documents. Buffer Expansion (#1490) is required on the 2772. The number of records (documents) held by the buffer is determined by the maximum record length for the fields selected for reading. The records/buffer is set at 4, 6, 8, 10 or 12. The records/buffer may be changed by the CE, but is not subject to customer control. In online transmission and pre-transmission verification operations, reading characters in excess of the maximum record length specified causes an error condition. The following options are available:

Maximum Record Length (including special symbols)	Records/buffer
53	4
41	6
30	8
24	10
20	12

**Balance-List (#1470)** facilitates pre-transmission balancing to batch total tickets of stacked batches. In Mode A, operating under 1255 speed limitations, the feature totals the Amount Field on good items and prints the good item total, batch ticket total, and derived difference on the 2770 system printer. In Mode B, under 2770 system printer speed limitations, good items are detail listed with the same total cycles as Mode A. Documents are listed with limited print editing and limited columnar formatting.

**Paper Quality:** The paper characteristics should comply with the characteristics described in the paper brochure, GH212-9639, except that the document dimensions are those detailed in "Documents" above.

**Publications:** System/3 -- GC20-8080 -- System/32 -- GC20-0032 -- System/34 -- GH30-0231 -- System/36 -- GC21-9015 -- 2770 -- GA24-3089 -- S/360 -- GC20-0360 -- S/370, 4300 -- GC20-0001

## SPECIFY

### ● Power (AC, 1-phase):

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811	200V	#2732
200V	#2806	208V	#9902
220V	#2813	230V	#9904
235V	#2814		

Must be consistent with system voltage -- specify code consistent with system/voltage for pre-system 1255 installation.

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray.
- Alternate Sort Pattern: #9301, if desired. Replaces the standard even/odd pattern with the 0-4/5-9 pattern. See "Sorting" above. May be changed in the field by no-charge MES.
- Account Number Field Length: (mdl's 1, 2, 3) Specify #9210 for 5 digits -- #9211 for 6 digits -- #9212 for 7 digits -- #9213 for 8 digits -- #9214 for 9 digits -- #9215 for 10 digits -- #9219 for variable-length. A fixed-field length assures maximum processing accuracy. However, a variable-field length may be specified in lieu of a fixed-field length. Length of the account number field may be changed in the field by no-charge MES.

- Superior Reading Performance: Self-Checking Number/Improved Recognition (#7060) is recommended -- see "Highlights" above and "Special Features" below.
- Use With System/3, System/32 or System/34: System/32/34 Adapter (#6303) is required -- see "Special Features" below.
- Use with 2770: Transmission Code -- #9761 for EBCDIC, #9762 for ASCII -- must be consistent with 2772 code. May be changed in the field by no-charge MES. Prerequisites: #7850 -- see "Special Features".
- Use with S/360 mdls 22, 25, 30, 40, 50, S/370 mdls 115 through 158, a 3031 Processor, or a 4300 Processor: S/360/370 Adapter (#6360) is required -- see "Special Features".
- Non-PCB Components: Specify #2888 for shipment to Japan or other countries requiring non-polychlorinated biphenyl components. Amount Field Length: (Mdls 1, 2, 3) Amount field length #2743 for 11 digits, #2744 for 10 digits, bracketed by the Amount symbol. May be changed in the field by no-charge MES.
- Transit (banks and branch) Field: (mdls 1, 2, 3) #2745 for 6-digit length with the transit (bank and branch symbol) on the right and the on-us symbol on the left. -- #2746 for 8-digit length, bracketed by the transit symbol. May be changed in the field by no-charge MES.
- Codeline Configuration: (Mdls 21, 22, 23) Use Customer Codeline Specification Sheet, Z112-6182, for specifying codeline configuration.
- Machine Nomenclature: #2927 for English UK, #2928 for France, #2930 for Japan, #2931 for Spain, #2932 for Italy.
- Kickstrips: #9431, if desired. Field Installation: Yes. Note: When installed, the open area under the machine is enclosed. This reduces the amount of "toe-room" for the operator and may be inconvenient to the customer if the power outlet is located under the machine.

## SPECIAL FEATURES

### (NO LONGER AVAILABLE FOR MDLS 1, 2, 21, AND 22)

**Balance-List (#1470):** (For use on 2770 system only) For pre-transmission balancing of stacked document batches. Accumulates the total of good items, with or without detail listing -- a batch total ticket initiates terminal printing of the good item total, batch ticket total, and net difference. Invalid items are rejected. In totaling mode, documents are checked for the maximum characters per document specified for transmission. In listing mode, a different number of characters per document may be specified on installation. In listing mode, selected fields are printed in document order with limited print editing -- the amount field is right justified with decimal insertion and high order zero suppression -- other fields are left justified in columns tabulated on the terminal printer -- special symbols, except dashes and the right amount field symbol, are indicated with substitute printer symbols. Selected fields, other than the process control field, missing from the document causes fields to print in alternate columns. Limitations: The feature is not operative during line transmission or fine sorting operations. Field Installation: Yes. Prerequisites: #7850 -- the 2770 system must include a printer or display unit.

**Dash Symbol Transmission (#3215):** Transmits the E13B dash symbol from transit field to storage. With symbol in storage, the program can distinguish between duplicate foreign and U.S. transit numbers. Limitations: Not available for mdls 21, 22 and 23. Field Installation: Yes.

**51-Column Card Sorting (#4380):** Mdl s 1, 21 -- for reading and sorting 51-column card documents. When installed, machine speed is reduced to approximately 405 dpm for 6-inch documents. For

51-column cards, speed is approximately 500 dpm. Mdls 2, 3, 22, 23 -- when installed, machine speed is reduced to approximately 605 dpm for 6-inch documents. For 51-column cards, speed is approximately 750 dpm. Note: For optimum performance on all mdls, card documents should be separated out from standard size documents on first pass operations. Field Installation: Yes.

**High-Order Zero and Blank Selection (#4520):** Permits selection to pocket "A" of documents during a digit sort having only blanks or zeros in the sort position and in all higher order positions of the field. Limitations: Available on mdl s 3 and 23 only -- operates off-line only. Field Installation: Yes.

**System/32/34/36 Adapter (#6303):** To attach the 1255 to the Serial I/O Channel (#7081) on the 5406, 5408, 5410, 5412, 5415, or to the 1255 Attachment Feature (#1100) on the 5320, 5340, and 5360. Limitations: Mdls 21, 22 and 23 may not be attached to System/3 mdl 6, System/32, System/34 or System/36. Field Installation: Yes. Specify: #9791 for use with 5406, or #9792 for use with 5408, 5410, 5412, 5415, 5320, 5340, or 5360. #9791 can be changed in the field to #9792, or vice versa.

**S/360/370 Adapter (#6360):** To attach the 1255 to the Byte Multiplexer Channel. Field Installation: Yes.

**Self-Checking Number/Improved Recognition (#7060):** For reducing rejects and substitutions caused by defects in the account number field and for checking Modulus 10 or 11 self-check digit account numbers up to 10 positions long, including the self-check digit and dashes. SLT pluggable card wiring determines the modulus calculated and weighting factor for each digit. SLT card is removed and inserted by the CE for customer wiring. An operator panel on/off switch is the only customer control of the feature. The self-check digit may be in any position, always using a weighting factor of 1. Modulus 10 will check any weighting factor 0 through 9, summing the product digits, and checking for an even multiple of 10. Modulus 11 will check any weighting factor, summing the products and checking for either an even multiple of 11, or for a constant remainder of 4.

This feature, when installed and operative, replaces the basic character substitution checking circuitry with the more accurate Modulus 10 or 11 checking circuitry while the account number field is being read. Documents with marginal printing that might normally be rejected as potential substitutions will be processed if all characters pass the self-checking digit test, thus reducing the chances of a reject. All account numbers that fail the self-checking digit test will cause the document to reject, thus reducing the chances of a substitution. Since the account number field is frequently subject to folds, banding, mutilation and print specification deviations, rejects and substitutions will be reduced in proportion to the severity of document degradation. Field Installation: Yes.

**2772 Adapter (#7850):** To attach the 1255 to a 2772 Control Unit. A switch (adjacent to the self-checking number switch) is provided which permits listing documents previously rejected to determine which field and which character caused the reject. Field Installation: Yes.

## MODEL CONVERSIONS

### (NO LONGER AVAILABLE)

Field installable only between model 1 and model 2, or model 21 and model 22.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

**1270 OPTICAL READER SORTER**
**PURPOSE**

OCR Document Input Unit for a S/360 models 22 through 50, S/370 models 115 through 155, all 4300 Processors and S/3. Reads and sorts documents with numeric code lines printed in either OCR-A font size I, or in OCR-B font size I. This is compatible with the OCR-A font and OCR-B font published in ISO Recommendations R1073, first edition, dated May, 1969, or with the OCR-B font published by the European Computer Manufacturers Association in the Standard ECMA-11 for optical recognition, second edition, dated October, 1971. Documents can be printed by a wide variety of devices, including 1403, 3203, 3211 printers and 3800.

For possible use with S/3 and S/360 mdl 20, see appropriate Machines pages in the sales manual.

**MODELS**

<b>Model 1</b>	001	Reads OCR-A font size 1-6 stackers
<b>Model 2</b>	002	Reads OCR-A font size 1-12 stackers
<b>Model 3</b>	003	Reads OCR-B font size 1-6 stackers
<b>Model 4</b>	004	Reads OCR-B font size 1-12 stackers

All mdls are for reading data into a S/360 mdls 22, 25, 30, 40, 50, S/370 mdls 115, 125, 135, 135-3, 138, 145, 145-3, 148, 155, 158, and all 4300 processors. Can be used also for offline sorting.

**Limitations:** For codeline position restrictions, see "Codeline Layout".

**Prerequisites**

**For 1270:** S/360 models 22, 25, 30, 40, 50, S/370 Models 115 through 155, or any 4300 Processor, attachment #2809 is required. All documents must be mechanically jogged prior to each pass through the machine. Jogglers are available from commercial sources.

**For S/370 mdls 115, 125:** External Signals (#3898) is required on the processing unit. S/360 attachment (#2809) is required on the 1270. Up to six 1270s can be attached to a system, depending on the system configuration and application. **Limitations:** For S/370 mdls 115, 125, the 1270 is not supported by the Mdl 20 Compatibility (#7520).

**For 4331 Processor:** External Signals (#3898) is required on the processor.

S/360 Attachment (#2809) is required on the 1270. Up to six 1270s can be attached to a system, depending on the system configuration and application. The 1270 attaches to the byte multiplexer channel (optional).

**For 4300 Processor:** S/360 Attachment (#2809) is required on the 1270. Up to six 1270s can be attached to a system, depending on the system configuration and application. The 1270 attaches to the byte multiplexer channel.

**For S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155:** Direct Control (#3274) is required on the processing unit. S/360 Attachment (#2809) is required on the 1270. Up to six 1270s can be attached to a system, depending on system configuration and application.

**For S/360 mdls 22, 25, 30, 40, 50:** Direct Control (#3274) or External Interrupt (#3895) is required on the processing unit. S/360 Attachment (#2809) is required on the 1270. Up to six 1270s can be attached to a system, depending on system configuration and application.

**For S/360 mdl 25 and S/370 models 115, 125:** A Multiplexer Channel (#5248) is required. See M3115, 3125 pages.

**For S/360 mdls 22, 30, 40, 50, or for S/370 mdls 135, 135-3, 138, 145, 145-3, 148, or 155 :** The channel is the standard multiplexer channel. A Multiplexer Channel (#5248) is required.

**HIGHLIGHTS**

A job-oriented machine for reading and sorting of single-line documents printed with size I of the OCR-A font or OCR-B font.

Mdls 1 and 2 read the ten digits and three special symbols: hook, fork, and chair, of the OCR-A font. Mdls 3 and 4 read the ten digits and three special symbols: plus, less than, and greater than, of the OCR-B font. In addition, a preprinted vertical ruling | may also be used as a special symbol on all mdls.

152mm (6 in.) documents are read at a rate of 750 per minute. Actual speed depends upon document length and paper characteristics.

Mdls 1 and 3 use six pockets (five sort stackers, plus one reject stacker) for a two-phase digital sort. Standard arrangement is: first-phase

sort, even digits and reject; second-phase sort, odd digits and reject. (For sort option, see "Specify".)

Mdls 2 and 4 have twelve pockets (ten sort stackers, one reject stacker and one A-stacker for Multiple Column Control or High Order Zero and Blank Selection).

Pocket selection may be controlled either by 1270 (offline mode) or by the system program (online mode).

**Document dimensions:** All mdls process intermixed paper documents with the following dimensions:

**Width:** 64 to 108mm (2.5 to 4.25 in.)

**Length:** 146 to 222mm (5.75 to 8.75 in.)

**Thickness:** 0.09 to 0.14mm (.0035 to .0055 in.) and card stock: 0.18mm (.007 in.)\*

**Paper Stock:** 75 to 120gr per square meter (20 to 32 pounds card stock)

\* Applicable only for 80-column IBM punch card or equivalent

**Paper Quality:** The paper should comply with the characteristics described in *Paper and Print Quality Requirements for IBM 1270 and IBM 1275 Optical Reader Sorters*, GA19-0036. Papers and print samples to be used must be evaluated by the IBM Document Evaluation Center, Sindelfingen, Germany -- approval to be obtained 120 days before shipment. Based on our experience in developing paper document handling equipment, IBM has developed a positive and comprehensive analysis procedure designed not to "accept" or "reject" paper, but only to report what is observed. Consult the Document Handling Coordinator in your country for details of the testing procedure.

**Printing:** For recommended ribbons, etc., see *IBM System/360 Component Description - IBM 1270 Optical Reader Sorter*, GA19-0035. For recommended printing on the 3800 printer, see *Reference Manual for IBM 3800 Printing Subsystem - OCR Document Preparation*, GA26-1646 and M3800 pages.

**Codeline Layout:** The codeline must be located between 8.5mm (16/48 in.) and 71mm (134/48 in.) from the bottom reference edge of the document.

The codeline can contain up to seven fields, each opened by a special symbol. Fields may be fixed in length (up to 20 positions), or variable. In a variable-length field, the 21st and higher-order positions cannot be used for sorting.

Special symbol sequences and field lengths are set to customer specifications during manufacturing, and can be altered by an IBM Customer Engineer on sales order. (See GA19-0036 for full specifications.)

**Checking:** The readability of all characters, including special symbols used as field separators, can be verified each time a document is read and/or sorted. A field-length check is made on all fixed-length fields being processed, to assure that all digits in the field have been read. If a document does not satisfy the checking conditions, it is rejected (when the 1270 is in the offline mode) or the error condition is presented for interrogation by the user program (when the 1270 is in the online mode).

**Standard Features:** All mdls include (1) hopper fed by gravity and providing maximum operator access; (2) indicating switches, displaying operating status of machine; (3) Movable Read Head permitting the operator to position the read head manually, to read (on separate passes) codelines which are located at different positions on the documents. Codelines (ideal print center lines) must be located between 8.5mm (16/48 in.) and 8.5mm (134/48 in.) from the bottom (reference) edge of the document.

**Programming Support:** See Programming Section *DOS/360 MICROCS*, 360N-10-477, for S/360 models 22, 25, 30, 40, 50, S/370 models 115 through 155, and all 4300 processors.

**Cable Length:** See GC19-0001.

**Bibliography:** *1270 Component Description*, GA19-0035; *S/360 Bibliography*, GA22-6522.

**MACHINES**
**1270 Optical Reader Sorter (cont'd)**
**SPECIFY**

- Power: (AC, 3-phase, 50 and 60 Hz): See "Power Requirements", GI Section 12 for voltage specify feature numbers.)
- Sort Option: **#9301** -- mdl's 1 and 3 only: first-phase sort, 0 to 4; second-phase sort, 5 to 9. **#2742** is required for the standard sort arrangement, mdl's 1 and 3 only. May be changed in the field by no-charge MES.
- Codeline Layout: Use Customer Codeline Specification Sheet, Z111-6654, for specifying codeline configuration. This form must be submitted to the plant at least 60 days before scheduled shipment.
- Language Groups: **#2927** for English, **#2929** for German, **#2930** for Japanese
- Color accent: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Kickstrips: **#9431**, if desired. Plant- or field-installed, no charge. Note: When kickstrips are installed, the open area under the machine is enclosed.
- Shipping instructions for all models: A vacuum cleaner is needed in every customer location for cleaning of 1270s and 1275s. Therefore, for the first Optical Reader Sorter of either type in a customer location, specify **#9030**. For second and subsequent units, do not specify **#9030**. Ensure that the order has the Branch CE Manager's approval and cross-refer to the serial or order number of the first 1270 or 1275 in the same location. Changes in location (even for the same customer) of a 1270 or 1275 require the Branch CE Manager's approval and may require ordering of **#9030**.

**SPECIAL FEATURES**

**Multiple Column Control (#2779):** This permits selection to pocket A of documents with specific numbers (in six or less consecutive columns) in any field. The other documents will be sorted normally. **Limitations:** Available on mdl's 002 and 004 only. Operates offline only. Cannot operate simultaneously with High Order Zero.

**High Order Zero and Blank Selection (#2780):** This permits, during a digit sort, selection to pocket A of documents having no digits except zero in the sort position and all higher order positions of the sort field. **Limitations:** Available on mdl's 002 and 004 only. Operates in offline mode only. Cannot operate simultaneously with Multiple Column Control.

**S/360 Attachment (#2809):** Required for attachment of the 1270 to S/360 mdl's 22, 25, 30, 40, 50, S/370 mdl's 115 through 155, and all 4300 processors.

**Mark Read (#2900):** Permits reading of marked information into a system. Marked and OCR information can be read from the same and from successive documents in one pass. A mark-read column contains ten mark positions corresponding to the digit-punch positions of an 80-column punched card. Blank positions are transmitted as blanks and multiple marks in one column are transmitted as unreadable characters. A timing mark is required for each mark-read column. Mark-read and OCR information cannot be placed on the same area of the document. The mark-read field substitutes a field in the OCR codeline. OCR information within 31.75mm (1-1/4 in.) left of a mark-read field cannot be read. The information should be recorded with a black HB pencil (equals #2) or other writing implement providing an equivalent output signal. The minimum document height which can be processed by machines equipped with this feature is equal to the 80-column punch card height, i.e., 82.5mm (3.25 in.). For more detailed information concerning paper parameters, mark dimensions, background colors, etc., refer to *Paper and Print Quality Requirements for IBM 1270 and 1275 Optical Reader Sorters*, GA19-0036.

Note: A throughput decrease of up to 10% may be encountered.

Note: All 1270 proposals must be reviewed by the Document Handling Coordinator before submission to prospect or customer.

**Self Checking Number Modulus 11 Technique (#7062):** A self-checking number consists of two parts: the basic identifying number and its check digit. The check digit, derived from the basic identifying number by one of two techniques, is always the units digit of a self-checking number. The feature assures that all digits in a self-checking number have been correctly recorded. The field is verified as it is read during any pass; and if it fails to satisfy the check, the document is routed to pocket R for mdl's 001 and 003, to pocket A for mdl's 002 and 004. If the Multiple Column Control (#2779) or High Order Zero (#2780) feature is also active, self-check error documents

are routed to the reject pocket. Maximum length of field is ten digits, including check digit. Weighting factors are 7, 6, 5, 4, 3, 2. When the self-checking number is greater than six digits, weighting factors are repeated. In some instances, random-type errors will not be detected. A basic number requiring a check-digit of 10 cannot be used.

**TERMS and CONDITIONS:**

Plan Offering: Plan A	Warranty: B
Additional Use Charge Percent: 30%	Per Call: 2
Purchase Option: 40%	Educational Allowance: No
Machine Group: C	Pre-Installation Test Allowance: None

**MODEL CONVERSIONS (None)**

Available at time of manufacture only

**ACCESSORIES (None)**
**SUPPLIES (None)**

## 1416 INTERCHANGEABLE TRAIN CARTRIDGE

### PURPOSE

A cartridge and print train which provides interchangeability of type font for the 1403 Printer model 3 or N1, and 3203 Printer (all models).

### MODELS

Model 1 001

**Prerequisites:** The 1416 functions only when mounted in a 1403 mdl 3 or N1, or a 3203 (all mdls). At least one 1416 is required with each 1403 mdl 3 or N1 or 3203 (all mdls).

### HIGHLIGHTS

**Interchangeability:** When multiple 1416s are available, they may be interchanged by the operator, providing flexibility for printing different type fonts, type styles, or character arrangements. This flexibility opens new application areas with unique printing requirements such as form-letter writing, engineering and scientific data, chemical abstracts, and text printing.

**Publications:** S/360 -- GC20-0360, S/370, 4300 -- GC20-0001, 1410/7010 -- GA22-6826, 1440 -- GA24-3005, 1460 -- GA24-1495, 7070/7074 -- GA28-6288

### SPECIFY

- Print Train Arrangement: See "Type Catalog" for characters in each available arrangement and feature numbers to be specified.
- A rental 1416 must be capacity replaced (unless customer desires to order an additional 1416) when the following are to be field installed: [1] Preferred Character Set Feature (#5523) on 1403 mdl 3 in 1400 series system ... [2] Universal Character Set Feature (#8640) on 1403 mdl 3 or N1 in S/360, S/370, 4300 processors ... [3] Any UCS train arrangement to replace AN or AH arrangement on a 3203 (all mdls), or a 1403 mdl 3 or N1 already equipped with Universal Character Set Feature (#8640) ... [4] A change in type size or style. If a purchased 1416 is involved, contact IBM, unless customer desires to order an additional 1416.
- When a Voltage Adapter (#9709) is field installed on a 1403 mdl 3, the standard configuration train previously used will be modified to an AN or HN arrangement; a PCS-A arrangement will be modified to a PCS-AN; or PCS-H will be modified to PCS-HN. Any of these changes is restricted to the same type size (style). See "Type Catalog - S/360, S/370 and 4300 Processors - 1403 and 1404 Printers" for feature number to which train is to be modified. Submit MES on 1416, specifying "Change installed train # \_\_\_\_\_ to # \_\_\_\_\_".
- Except as stated above, order type slug substitutions whenever changes between the following train arrangements are to be made in the field: A and H ... AN and HN ... PCS-A and PCS-H ... PCS-AN and PCS-HN. See "Type Catalog".
- A separate 1416 is required for each print train.
- Depending upon the system involved, see appropriate section of "Type Catalog" for feature numbers of desired OCR arrangements and associated sales manual "Reader" description pages to assure compatibility of printer/reader recognition ability. Note: The ribbons used on the 1403 and 3203 must be capable of producing printed characters suitable for recognition by the optical reader used. Recommended ribbons and document specifications are referenced in the optical reader "Machines" pages.
- Language Groups: #2927 for English, #2928 for French, #2929 for German.
- Katakana (Japanese characters), if desired: #2921 for 107-character Katakana, #2873 for 127-character Katakana.

**Inspection:** Field inspection of damaged 1416s will be at no charge (except for travel time and expense, if applicable).

**Repair:** Purchased 1416s which become damaged or inoperable may be returned to the IBM plant (Järfälla, Sweden) for repair. Transportation charges to and from the plant are to be paid by the customer. The following repairs will be performed per 1416:

- Disassemble, inspect, test, clean, replace idler gear and drive gear, and reassemble ††
- Replace cams on original base plate assembly
- Replace base plate assembly (856186)
- Replace standard type slugs †

† When a character is replaced, all identical characters should be replaced to ensure consistent print-out of identical characters. Unless otherwise specified, the plant will replace these slugs at the stated price per type slug. See "Type Catalog".

When replacement of special characters (special slugs) is required, the original charges (excluding artwork and matrix charges) for those special characters will apply for this replacement.

During the fourth through twelfth month of the warranty period, contact @SS@IBM for charges. There will be no charge for replacement of defective parts during this period. After the twelfth month when the warranty has expired, contact @SS@IBM for charges.

In the event a 1416 is damaged to the point where, in the opinion of IBM, repair is not possible, the 1416 will be returned to the customer. In this case, none of the prices will apply.

**Note:** An emergency replacement procedure for damaged 1416s is available.

1416s for temporary installation are available at a daily rental based on the regular monthly charge, until the repaired 1416 is returned. Shipping charges for the temporary 1416 will be charged to the customer.

IBM will bear the transportation and repair charges when the damage to a purchased 1416 is categorized as "IBM responsibility" by the branch manager, e.g., 1416 received in damaged condition, IBM employee drops a 1416, etc. In cases of IBM responsibility, a temporary replacement 1416 will be supplied at no charge.

IBM guarantees that the repaired 1416 will be returned to the customer in operable condition.

### SPECIAL FEATURES (None)

### TERMS and CONDITIONS

Plan Offering: Plan B  
Purchase Option: 55%  
Warranty: B  
Per Call: 3  
Educational Allowance: Yes  
Pre-Installation Test Allowance: None

### MODEL CONVERSIONS (None)

### ACCESSORIES (None)

### SUPPLIES (None)

## 1419 MAGNETIC CHARACTER READER

### PURPOSE

Reads magnetically inscribed data from card and paper documents into a 1401, 1410, 1460, System/3 model 12 or 15, S/360 model 22, 25, 30, 40, 50, 65, 67, any S/370 processor (except 3081, 3083 3084, or 3090), or a 4300 Processor. Can be used for offline sorting.

### MODELS

Model 1 001 E13B type font, codeline arrangement as designated by the American Bankers Association Technical Committee on Mechanization of Check Handling. Intermixed paper and card documents within the following specifications can be processed:

Width: 2-3/4 in. to 3-2/3 in.  
 Length: 6 in. to 8-3/4 in.  
 Thickness: 0.003 in. to 0.007 in.  
 Paper Stock: 20 lb. short grain to 44 lb. card stock

Fifty one column card stock can be fed at a rate of approximately 1,960 cards a minute.

**Note:** For sorting 51-column cards, see 51-column Card Sorting (#4380) under "Special Features".

Model 031 E13B type font, codeline arrangement as model 1, but handles documents with the following specifications:

Width: 70 to 105mm (2.75 in. to 4.134 in.)  
 Length: 148 to 222mm (5.83 in. to 8.75 in.)  
 Thickness: 0.09 to 0.14mm (0.0035 in. to 0.0055 in.)  
 Paper Stock: 85 to 120gr/sq.m (22 lb. short and long grain to 32 lb.).

Model 032 CMC-7 type font (coded magnetic character with 7 bars), expanded codeline feature is standard, handles documents with specifications and paper stock like mdl 31. Type font according to ECMA specifications.

### Prerequisites

**System/3 mdls 12 and 15:** One 1419 can be attached. It requires the Mdl 20 Attachment (#9710) and RPQs WB1253 and S00382. All mdls of the System/3 must be equipped with a Serial I/O Channel (#7081).

**Note:** RPQ WB1253 only must be approved by Special Product Marketing in Rochester. RPQ S00382 is required to process checks with 9-digit routing/transit number.

**S/360 mdl 22, 25, 30, 40, 50, 65, 67, any S/370 (except 3081, 3083 or 3084), or 4300 processor:** Up to six 1419s can be attached to a system. Each 1419 requires a S/360 Single Address Adapter (#7720) or S/360 Dual Address Adapter (#7730 or #2996); see "Special Features" below. Each 1419 requires a channel control unit position. RPQ SU0044 is required on the 3115 Byte Multiplexer Channel (#5248).

- S/360 mdl 25: Special feature on 2025: Multiplexer channel, or selector channel.
- S/360 mdl 22, 30, 40, 50: Multiplexer channel (standard), selector channels (special features, except on 2022 one selector channel is standard).
- S/360 mdl 65, 67: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on a 2870; see M2860, 2870 pages.
- S/370 mdl 115, 125: Byte multiplexer channel (special feature), External Signal (#3898); See M3115, 3125 pages. On a 3115-0, #9336 is required.
- S/370 mdl 135: Multiplexer channel (standard), selector channels (special features); see M3135 pages.

- S/370 mdl 135-3: Byte multiplexer channel (standard), block multiplexer channels (special features); see M3135-3 pages.
- S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard); see M3138 pages.
- S/370 mdl 145: Multiplexer channel (standard), selector channels; see M3145 pages.
- S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels; see M3145-3 pages.
- S/370 mdl 148: Byte multiplexer channel (standard), block multiplexer channels (standard); see M3148 pages.
- S/370 mdl 155, 158: Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard); see M3155, 3158 pages.
- S/370 mdl 165, 168: Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) on 2870; see M2860, 2870 pages.
- 3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard); see M3031 or 3032 pages.
- 3033 Processor: Byte multiplexer channels, block multiplexer channels; see M3033 pages.
- 4300 Processor: Byte multiplexer channel, block multiplexer channel (optional), External Signals (#3898); required on 4331.

**Note:** Before ordering, read descriptions of #7720 and #7730 and #2996 under "Special Features" below for further prerequisites and limitations.

**1401/1460:** One 1419 can be attached. A Serial I/O Adapter (#7080) is required on the 1401 or 1441 Processing Unit.

**Note:** For optimum operation, Processing Overlap (#5730) is recommended on the 1401 or 1461 I/O Control. Without it, a maximum of 9.5 milliseconds are available for processing of data from the 1419. Limitations: A 1419 cannot be installed with 1401 A, G or H mdls; on a 1401, diagnostic programs require a minimum of 4,000 positions of storage.

**1410:** One 1419 can be attached to each channel; simultaneous use of two 1419s increases the number of documents converted up to 90 percent, exclusive of operator handling time. A Magnetic Character Reader Adapter (#4900, #4902, #4903) is required on the 1411 Processing Unit. Limitations: Can be installed only on 1411 mdls A1 through A5.

### Limitations

- S/360 mdl 25, 30: Operation of 1419s is not included under 1401/1440/1460 Compatibility features.
- S/360 mdl 40: Operation of 1419s is not included under 1401/1460 Compatibility (#4457) or 1410/7010 Compatibility (#4478).
- S/360 mdl 50: Operation of 1419s is not included under 1410/7010 Compatibility (#4478).
- S/360 mdl 67: Only when operating in mdl 65 mode.
- S/370 mdl 115: Operation of 1419s is not included under S/360 Mdl 20 Compatibility (#7520).
- S/370 mdl 125: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#4457) or S/360 Mdl 20 Compatibility (#7520).
- S/370 mdl 135, 135-3, 138: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#4457).

## MACHINES

- S/370 mdl 145, 145-3, 148: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#4457) or 1401/1440/1460, 1410/7010 Compatibility (#4458).
- S/370 mdl 155, 158: Operation of 1419s is not included under 1401/1440/1460, 1410/7010 Compatibility (#3950).
- 4331 Processor: Operation of 1419s is not included under 1401/1440/1460 Compatibility (#3950).

## HIGHLIGHTS

Documents read at a maximum rate of 1,600 documents a minute. Actual speed depends upon length of document and stored program. Pocket selection may be controlled by the 1419 or system's program. Feeding is controlled by the system. Can also be used for offline sorting. Processing Overlap (#5730) is required on the 1401 or 1461 (1460) to take full advantage of the 1419's speed. Individual fields can be processed immediately after they are read. Document reading can be overlapped with processing. Minimum processing time, including pocket selection, is 32.2 milliseconds; more than ample for sophisticated applications.

**Checking:** Readability of each magnetic character, including special symbols, in each field processed can be verified each time a document is read and/or sorted. A field length check may be made on all fixed-length fields being processed in offline mode to assure that all numeric digits in the field have been encoded. When the 1419 is under control of the system's program, the 1419 sends control signals to the processor so that the program may determine document distribution. Documents not satisfying checking conditions may be rejected. Fixed-field lengths provide a powerful technique for controlling accuracy of processing.

**Paper Quality:** The paper characteristics should comply with the characteristics described in the paper brochure, G212-9639. It is suggested that papers be tested in the IBM Paper and Printing Laboratory. Based on our experience in developing paper document handling equipment, IBM has developed a positive and comprehensive analysis procedure designed not to "accept" or "reject" paper, but only to report what is observed. We strongly recommend that our sales force sell this IBM service to interested customers or prospects. Consult Special Engineering for details of testing procedure.

**Programming Compatibility:** Reprogramming is required whenever: (1) A 1419 replaces a 1412 in an existing 1400 series installation; (2) a S/360, S/370, or 4300 processor replaces a 1400 series installation; (3) a S/360 mdl 22, 25, 30, 40, 50, 65, any S/370 (except 3081, 3083 or 3084), or 4300 processor replaces a S/360 mdl 20; (4) a conversion is made from one programming system to another.

**Publications:** S/360 -- GC20-0360, S/370, 4300 -- GC20-0001, 1401/1460 -- GA24-1495, 1410 -- GA22-6826; "IBM 1419 Magnetic Character Reader Reference Manual", GA24-1499; "IBM System/3 1255 and 1419 Magnetic Character Readers Reference and Program Logic Manual", GC21-5132

## SPECIFY

- Power (AC):
 

50 Hz (3-phase)	60 Hz (1-phase)
200V #2807	208V #9902
220V #2815	230V #9904
235V #2818	
380V #2816	
408V #2819	
- Color: Color Accent -- #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray. Extended Color -- #9031 for red, #9032 for yellow, #9033 for blue.

Field Lengths: Specify two feature numbers, one for Account Number, one for Process Control; see table below. Fixed-field lengths assure maximum processing accuracy. Variable-length fields may be specified in lieu of fixed lengths. Field lengths on installed machines may be changed by no-charge MES. Limitations: Not available for mdl 32.

Fixed-Field Length (position)	Account Number	Process Control
1	----	#9190
2	----	#9191
3	----	#9192
4	----	#9193
5	#9210	#9194
6	#9211	#9195
7	#9212	----
8	#9213	----
9	#9214	----
10	#9215	----
Variable-Field Length	#9219	#9189

For mdl 32 with Expanded Codeline, use Customer Codeline Specification Sheet, Z112-6182, for specifying codeline configuration.

- Shipping Instructions: #9691 for stackers assembled (sorter section 76.27cm/35-3/4 in. deep), #9692 for stackers disassembled (sorter section approximately 81.28cm/32 in. deep).
- S/360 Mdl 20 Attachment: #9710, if desired. Required to attach the 1419 to a System/3 and must be modified by RQs W B1253 and S00382. For field installation, the 1419 must have EC 127384 or above; can be removed in the field.
- With #9710 installed, the 1419 cannot be used interchangeably with a 1400 series processor or a S/360 mdl 22, 25, 30, 40, 50, 65 or 67, any S/370 processor or any 4300 processor.
- Kickstrips: #9431, if desired; also available on no-charge MES. When kickstrips are installed, the open area under the machine is enclosed. This reduces the amount of "toe-room" for the operator and may be inconvenient to the customer if the power outlet is located under the machine.
- Isolation Feature: May be required on units shipped prior to December 29, 1967 for attachment to a S/360; see "Special Features".
- Non-PCB Components: #2888 for shipment to Japan or other countries requiring non-polychlorinated biphenyl.

## SPECIAL FEATURES

**Batch Numbering (#1445):** Provides an automatic means of advancing a batch number document identification under program control. Consists of a 6-position impact printer which prints up to 999,999. The five low-order digits are advanced under processor control; the high-order digit is set manually. The batch number can be printed in any one of six locations on the back of the document. Limitations:

1. Batch number advance instructions given more often than once in a given 3-second period will cause suspension of feeding for the remainder of the period. Minimum batch size that can be processed without restriction is influenced by those factors affecting throughput. Refer to Reference Manual.
2. Legibility of batch numbers is influenced by the quantity of reverse side printing, the color and density of the ink used in reverse side printing, and surface irregularities caused by the printing process used. A typical example of documents with one or more surface irregularities is Traveler's Cheques. Customers must be advised that on these types of documents reduced ribbon life can be expected.

3. When 51-column cards are processed, print location 6 cannot be used.
4. This feature is not available for use in 1410 systems.
5. Cannot be installed with Endorser (#3791). Uses purple ribbon (413193), or equivalent. See GA24-3342 for details. Prerequisites: For field installation, 1419 mdls 1 and 31 must have EC 127244 or above and mdl 32 must have EC 126623 or above.

**Dash Symbol Transmission (#3215):** Transmits the E13B dash symbol from transit field to storage. With symbol in storage, program can distinguish between duplicate Canadian and U.S. transit numbers. Maximum: One. Limitations: Not available for mdl 32.

**Electronic Accumulator and Sequence Checking (#3610):** (Plant installation only) Accumulating -- amounts read from documents and accumulated total printed on paper tape. Maximum accumulation is ten digits. Rejected documents not accumulated. Sequence Checking -- selected positions in a field compared with same positions in preceding documents to assure that all documents are in proper order. Maximum of ten positions can be sequence checked in single pass. Limitations: This feature does not function when the 1419 operates in online mode with any S/360, S/370 or 4300 processor.

**Note:** This feature is a separate unit, cable connected to 1419; 43cm (17") x 52cm (20-1/2") x 98cm (38-1/2"); weight 48kg (105 lbs). Prerequisites: #5201 or #2779.

**Endorser (#3791):** (Plant installation only) (mdl 1, 60 Hz only) Imprints full endorsement at speed of 1419. Operator can select one of six endorsing positions in accordance with ABA specifications. With this feature, documents can be endorsed with date, identification number and bank's legal endorsement. The Endorser Plate is made to the customer's specifications. See "Accessories" below. A Blank Endorser Plate is also available if only partial endorsements are required. Limitations: Cannot be installed with Batch Numbering (#1445).

**Endorse Only (#3795):** (Plant installation only; if Endorser (#3791) is installed, it can be changed in the field to #3795.) Imprints full endorsement at speed of 1419. Vertical location of endorsement is specified by customer and set at plant. A left or right printing position can be selected by operator. Identification number printing is not provided. The date printing unit is at trailing end of endorsing device. With this feature, documents can be endorsed with date, identification number and bank's legal endorsement. The Endorser Plate is made to the customer's specifications. See "Accessories" below. A Blank Endorser Plate is also available if only partial endorsements are required. Specify: #9167 for endorsement at top, #9168 for center or #9169 for bottom. Limitations: Cannot be installed with Endorser (#3791).

**Expanded Capability (#3800):** Provides a command for operation under OS. When in OS mode, stacker select time available using the Dual Address Adapter (#7730) is reduced by 2 ms. Exposure to data overruns caused by 1419s interfering with other 1419s operating on the same channel is eliminated. Overrun exposure and maximum number of 1419s per channel are configuration- and application-dependent; refer to GC21-5006. Compatibility with DOS Dual Address Support is provided for conversion to OS. OS or DOS mode of operation is established by a field modification to the feature by CE. Prerequisites: Each 1419 requires #7730 or #2996; EC259399 is required on a S/360 mdl 50, and EC 712822 is required on a 2870 for operation on a S/360 mdl 65 or S/370 mdl 165.

**251-Column Card Sorting (#4380):** (mdl 1) For sorting 51-column card documents offline, which may be intermixed with documents and cards within the specifications listed under "Models" above. When installed, machine speed is reduced. Formula for calculating feeding rate is:

$$15,720 + (L + 0.725L)$$

where L is document length in inches.

For 51-column cards, speed is approximately 1,875 documents/minute; for 6-inch documents, approximately 1,515

documents/minute. Decks containing 51-column cards must be mechanically jogged prior to each pass.

**Isolation Control Unit (#4700):** (Field installation on units shipped prior to December 29, 1967 only; standard on units shipped after that.) To turn power on or off the 1419 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating. Prerequisites: #7720 or #7730 or #2996; since in all cases there are compatible EC level requirements, the concurrence of the Branch CE Manager is required for any order for this feature.

**Multiple Column Control (#2779, #5201):** Permits selection of documents with a specific number in any field. With #2779, a specific number in six or less columns can be selected. With #5201, a specific number can be selected in four or less columns in any field. Limitations: Mdl 1 and 31 -- #5201 only, mdl 32 -- #2779 only.

**Program Control for Pocket Lights (#5739):** To facilitate control of output batches in the transit application. On 1419s attached to a System/3, S/360, S/370, 4300 processor, 1401 or 1460, the program stops the 1419 when a predetermined number of documents has entered one of six pockets designated by the program and turns on the appropriate pocket light(s) (A-3). Limitations: Not available for use in a 1410 system.

**Program Control for Pocket Lights 7-12 (#5741):** Facilitates control of output batches in the transit application when more than six pockets are being filled. Provides lights for pockets 4-9, enabling program to turn on a light(s) for any of the first 12 pockets designated. Limitations: Not available for use in a 1410 system. Prerequisites: #5739, plus EC 125358A, or, for field conversion, FBW 488231.

**Self-Checking Number (#7061, #7062):** A self-checking number consists of two parts, the basic identifying number and its check digit. The check digit, derived from the basic identifying number by one of two techniques, is always the units digit of a self-checking number. The feature assures that all digits in a self-checking number have been correctly recorded. The field is verified as it is read during any pass. Limitations: Self-checking numbers for Modulus 10 (#7061) are not compatible with those for Modulus 11 (#7062).

- #7061 - Modulus 10: Has weighting factor of 1, 2, 1, 2, 1, 2. Will not detect the following types of errors: 09 or 90 transpositions; interchange of digits between alternate columns, e.g., 32647 for 34627; substitution of one self-checking number for another; in some instances, transpositions having the formula "BAB" for "ABA", e.g., 121 for 212; in some instances, random errors, e.g., 23 printed as 56.
- #7062 - Modulus 11: Has weighting factor of 7, 6, 5, 4, 3, 2; when self-checking number is greater than six digits, weighting factor is repeated. In some instances, random type errors will not be detected, nor can a basic number requiring a digit of 10 be used.

**Split Field (#7440):** (mdl 1, 31) The first ABA dash symbol following a digit (e.g., a dash in units position of a field is ignored) will separate any field into two elements. Each of the elements may vary in length. With this feature, either element can be treated as a separate field. Specify: First Element (#9180) - required when Self-checking Number (#7061, #7062) is ordered and is to operate only on the first element of the split field. Limitations: Not available for mdl 32.

**S/360 ADAPTER (#7220 for Single Address, #7730 for Dual Address):** One of these adapters is required on each 1419 attached to a S/360 mdl 22, 25, 30, 40, 50, 65 or 67, any S/370 processor or any 4300 processor. Limitations: Once #7720 or #7730 has been installed, the 1419 cannot be used with a 1400 series processor without submission of an RPQ. Maximum: One per 1419, #7720 or one #7730.

- S/360 Adapter - Single Address (#7720): Up to six 1419s attached to a system are supported by DOS; exposure to late stacker selects should be considered in determining the maximum number of 1419s that may effectively operate on a system, in addition to those factors outlined under DOS in

"Programming". Limitations: Programming support precludes concurrent operation of 1419s equipped with #7720 and those equipped with #7730. Prerequisites: In order to operate with DOS or BPS, #3274 or #3895 is required on the processing unit.

**Note:** Intersystem attachment via Direct Control is limited when the 1419 uses external interrupt lines. Signal-in lines used by 1419s cannot be shared with the second processing unit. To operate with DOS, the 1419 must have EC 131182. When equipped with #7720, it is recommended that 1419s be attached to a multiplexer channel and they should normally be the highest priority devices on the channel.

- S/360 Adapter - Dual Address (#7730 and #2996): With this feature more stacker select time is available than with #7720. #7730 for mdl 1 and 31 only, #2996 for mdl 32 only. Available stacker select time with #7730 is based on the last field selected for reading; account number -- 27 ms, transit number -- 21 ms, serial number -- 15 ms. In order for these times to be valid, document field placement must be within the standards and specifications of the ABA Common Machine Language Specifications, Canadian Bankers Association, Australian Banks Automation Committee or the London Clearing Bankers Committee.
- Feature #2996: To accommodate the flexibility of the Expanded Codeline feature, three read command termination times are provided. Only one time will be operative during any processing run as determined by the last field selected for transmission. Each termination time is adjustable and their assignment to fields selected for transmission is program-wired in the 1419 (i.e., one customer may use field 3 to select a termination time, while another customer will use field 4).

The termination times will be adjusted and field assignments will be made at installation to conform to the customer's codeline and application.

The termination times are adjustable as follows:

First Termination Time (T1) -- 19 ms to 26 ms after the document arrives at the read head.

Second Termination Time (T2) -- 2 ms to 9 ms after T1.

Third Termination Time (T3) -- 2 ms to 9 ms after T2.

The available stacker select time for a particular processing run depends upon which termination time is operative during the run. The stacker select time is calculated by subtracting the termination time from 45 ms.

The following example will illustrate the calculations:

Assume T1 = 19 ms  
T2 = T1 + 9 ms = 28 ms  
T3 = T2 + 4 ms = 32 ms

Run #1 With T1 operative Stacker  
Select time = 45 ms - T1 =  
45 ms - 19 ms = 26 ms

Run #2 With T2 operative Stacker  
Select Time = 45 ms - T2 =  
45 ms - 28 ms = 17 ms

Run #3 With T3 operative Stacker  
Select Time = 45 ms - T3 =  
45 ms - 32 ms = 13 ms

Both features include two distinct control units; each with a separate address, its own set of executable commands, status and sense indicators. Each 1419 requires only one system control unit position. Prerequisites: If the 1419 is attached to a 2022 or 2030 multiplexer channel via #7730 or #2996, #9185 must be specified on the 2022 or 2030. If #7720 is changed to #7730 or #2996 by MES, #9185 must be added to the 2022 or 2030.

## DOS

Up to six 1419s attached to a system are supported by DOS. The limiting factors concerning the number of 1419s that may be attached to a system are stacker select time requirements and channel capacity. Since these factors are application- and configuration-dependent, consult the appropriate channel loading and DOS SRLs to determine the maximum number that may be operated effectively. Limitations: DOS support precludes concurrent operation of 1419s equipped with #7730 or #2996 and those equipped with #7720; 1419s equipped with #7730 or #2996 can be attached only to a multiplexer channel and should normally be the highest priority devices on the channel. Prerequisites: #3274 or #3895 or #3898 is required on the processing unit (except the 4361 and 4381 Processor).

**Note:** Intersystem attachment via Direct Control is limited when the 1419 uses the external interrupt lines. Signal-in lines used by 1419s cannot be shared with the second processing unit. For field installation of #7730, the 1419 must have EC 131196 or above. For field installation of #2996, the 1419 must have EC 133483 or above.

## OS

Limitations: 1419s equipped with #7730 or #2996 (required for OS) can be attached only to a multiplexer channel, must be physically cabled last on the channel, and should be the highest priority devices on the channel. Prerequisites: For operation under OS, each 1419 must be equipped with #3800.

**Note:** All proposals must be reviewed by the Document Handling Organization before submission to prospect or customer.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the desired feature number indicated.

**Endorser Plate (#3792):** Made to customer's specifications; for use with #3791 or #3795. Documents can be endorsed with date, identification number, and bank's legal endorsement. For further information, see Endorser Plate Specification Sheets, Z120-0563. It is recommended that the customer stock at least one spare endorser plate for each group of machines with identical plates, since plates cannot be immediately replaced. When ordering #3792 for shipment with a machine, specify color of ink to be used: #9145 for black. **Note:** 1419 endorser plates are not interchangeable with other machine types. An additional charge will be made for an endorser plate that requires art and layout work which cannot be accomplished by straight-line typesetting. This additional charge applies to single plate orders and the first plate of multiple plate orders. Art and layout work, if required, additional, specify #3796. The endorser plate on a displaced machine is to be left with the machine, but defaced and rendered unusable. The normal plate charge will apply whenever replacement of a worn or damaged plate is required. Charges for art and layout work are to be added, if applicable. Field Installation: Order #3792. In all cases, if art and layout work is required for #3792, also order #3796. A completed Endorser Plate Specification Sheet (Z120-0563) must be forwarded to the plant for each machine. If available, a sample endorsement should be attached to each Spec Sheet.

**Blank Endorser Plate (#3793):** For use with #3791 or #3795. Documents can be endorsed with date, identification number, and bank's legal endorsement. For further information, see Endorser Plate Specification Sheets, Z120-0563. When ordering #3793 for shipment with a machine, specify color of ink to be used: #9145 for black, #9146 for green, #9147 for purple, or #9148 for red. **Note:** 1419 endorser plates are not interchangeable with other machine types. The endorser plate on a displaced machine is to be left with the

machine, but defaced and rendered unusable. The normal plate charge will apply whenever replacement of a worn or damaged plate is required. Field Installation: Order #3793. A completed Endorser Plate Specification Sheet (Z120-0563) must be forwarded to the plant for each machine.

**Endorser Plate for Mechanical or Replacement Machine (#9140):** 1419 replaced by 1419; made to customer's specifications; for use with #3791 or #3795. A replacement endorser plate will be shipped with each replacement machine at no charge when the machine being replaced has an endorser. If any change in plate design is desired, there is a charge only for art and layout work (#3796), if applicable. Attach sample endorsement to the Endorser Plate Specification Sheet (Z120-0563) and forward to the plant. For further information, see Endorser Plate Spec Sheet. When ordering #9140 for shipment with a machine, specify color of ink to be used: #9145

for black, #9146 for green, #9147 for purple, or #9148 for red. Note: 1419 endorser plates are not interchangeable with other machine types. An additional charge will be made for an endorser plate that requires art and layout work which cannot be accomplished by straight-line typesetting. The endorser plate on a displaced machine is to be left with the machine, but defaced and rendered unusable. Field Installation: Order #9140. In all cases, if art and layout work is required for #3792, also order #3796. A completed Endorser Plate Specification Sheet (Z120-0563) must be forwarded to the plant for each machine. If available, a sample endorsement should be attached to each Spec Sheet.

**SUPPLIES**

I Ink Container: P/N 424856 - Black

**1442 CARD READER MDLS 3, 4**

[ NO LONGER AVAILABLE ]

**PURPOSE**

Punched card input unit for a 1240, 1410, 1440 or 7010 system.

**MODELS**
**Model 3 003** For 1410 or 7010 ... has one stacker.

**Model 4 004** For 1240 or 1440 ... has two stackers.

**Maximum:** Up to two 1442 mdl 3s can be attached to a 1410 or 7010 system, one on channel 1 and one on channel 2 ... up to two 1442 mdl 4s can be attached to a 1240 or 1440 system.

**Limitations:** On a 1240 or 1440, if a 1442 mdl 1 or 2 or a 1444 is used, only one 1442 mdl 4 can be installed ... if two 1442 mdl 1s and 2s in any combination or both a 1442 mdl 1 or 2 and a 1444 are used, a 1442 mdl 4 cannot be installed.

**Prerequisites**
**For 1410 or 7010:** #4659 or #4660 on the 1411 or 7114 (#4660 requires a 1411 mdl A1-A5).

**For 1240 or 1440:** The first 1442 (mdl 1, 2 or 4) attached must have #1632 ... see " Special Features ".

**HIGHLIGHTS**

Provides high-speed, low-cost punched card input. Cards are read by a light-sensing unit at speeds up to 400 cards/minute. The 64 codes of the BCD Code can be read. Invalid codes and mispositioned cards are detected. The light-sensing mechanism is checked for proper functioning in every read cycle. Has a 1,200-card capacity hopper. Mdl 3 has one 1,300-card capacity radial stacker ... mdl 4 has two.

**Card Limitations:** Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

**Internal Scores** (before separation) -- S-1, ID-1, ID-2, and for a maximum of three passes, M-4 and M-5.

**External Scores** (after separation) -- column 1 end: OM-2, M-3, M-4, M-5, M-7, M-11 (with round corners), CF-4 and CF-11 (with round corners) ... column 80 end: M-3, M-6, M-7, M-11 (with round corners), CF-11 (with round corners), and for a maximum of three passes, M-5, OM-2, CF-4.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

**Bibliography:** 1240/1440 -- GA22-3005, 1410/7010 -- GA11-6826

**SPECIFY**
*The following specify features can be changed in the field.*

- Power (AC):

**Mdl 3 (1-phase):**

50 Hz	60 Hz
100V #2804	208V #9902
110V #2805	230V #9904
123.5V #2811	
200V #2806	
220V #2813	
235V #2814	

**Mdl 4 (3-phase):**

50 Hz	60 Hz
200V #2807	208V #9903
220V #2815	230V #9905
235V #2818	
380V #2816	
408V #2819	

Must be consistent with system voltage.

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray.
- Interconnection with Non-IBM Equipment: #9995 for process line by other manufacturer, #9996 for no-process line.

**SPECIAL FEATURES**
*The following features, as appropriate, are on an "as available" basis for field installation.*
**Card Image (#1531):** [ Mdl 4 ] To convert binary coded cards into BCD codes ... also permits processing of cards with multiple punching in a single card column. Approved scored cards can be read without suspending validity checking in other than the scored columns. When reading in card image mode, the validity check is suspended because all characters are considered valid. Cards with interspersed conventional punching codes and binary coded data can be read. When installed on the first 1442 attached to a system, this feature also functions on a second 1442 in the system. **Prerequisites:** #9035 on the 1241 or 1441.

**Card Read Punch Adapter (#1632):** [ Mdl 4 ] Required on the first 1442 attached to a system ... the second 1442 does not require this feature. When a 1442 mdl 1 or 2 and a 1442 mdl 4 are both attached to a system, the 1442 mdl 1 or 2 must be the first unit attached and must be equipped with this feature.

**Input/Output Adapter (#4661):** [ Mdl 3 ] To attach a 1414 I/O Synchronizer mdl 5 or 8 with the teleprocessing units or printer it controls to the 1442 mdl 3.

**TERMS and CONDITIONS**
**Plan Offering:** Plan A  
**Additional Use Charge Percent:** 30%  
**Purchase Option:** 45%  
**Machine Group:** C  
**Warranty:** B

**Per Call:** 3  
**Metering:** I/O Unit (online)  
**Educational Allowance:** Yes  
**Pre-Installation Test Allowance:** 3 hours

**MODEL CONVERSIONS** (None)

**ACCESSORIES** (None)

**SUPPLIES** (None)

**MACHINES**
**1442 CARD PUNCH MDL N2**
**PURPOSE**

Punched card output unit for a S/360 model 22 through 75, any S/370 processor (except 3081, 3083 or 3084), or 4300 Processor ... punches cards at a rated speed of 160 columns/second.

**MODELS**

**Model N2 N02** [NO LONGER AVAILABLE]

**Maximum:** The number of mdl N2s that can be attached depends upon the number of available system control unit positions.

**Prerequisites:** An available control unit position on a system channel.

**S/360 mdl 25:** Special feature of 2025: Multiplexer or selector channel.

**S/360 mdl 22, 30, 40, 50:** Multiplexer channel (standard), or selector channels (special features, except on 2022 one selector channel is standard).

**S/360 mdl 44:** Special features on 2044: Multiplexer channel, high speed multiplexer channels, or add'l high speed multiplexer subchannels.

**S/360 mdl 65, 67, 75:** Selector channel of 2860, basic multiplexer channel of 2870, or selector subchannels (special features) on 2870 ... see M2860, 2870 pages.

**S/370 mdl 115, 125:** Multiplexer channel (special feature) ... see M3115, 3125 pages.

**S/370 mdl 135:** Multiplexer channel (standard), selector channels or block multiplexer channels (special features) ... see M3135 pages.

**S/370 mdl 135-3:** Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages.

**S/370 mdl 138:** Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.

**S/370 mdl 145:** Multiplexer channel (standard), selector channels ... see M3145 pages.

**S/370 mdl 3145-3:** Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

**S/370 mdl 148:** Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

**S/370 mdl 155, 158:** Multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155, 3158 pages.

**S/370 mdl 165, 168:** Selector channel of 2860, basic multiplexer channel of 2870, selector subchannels (special features) of 2870, or the shared subchannel of 2880 ... see M2860, 2870, 2880 pages.

**3031, 3032 Processor:** Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.

**3033 Processor:** Byte multiplexer channels, block multiplexer channels ... see M3033 pages.

**4300 Processor:** Byte multiplexer channel, block multiplexer channel.

**HIGHLIGHTS**

Format control and analysis are performed by the system's processing unit. Blank or prepunched cards are punched serially. Actual speed depends upon the number of columns punched, including interspersed blank columns. Rated speed for punching columns 1-10 is 265 cards/minute ... for punching columns 1-80 is 91 cards/minute. Punching is checked. The unit has a 1,200-card capacity hopper and a 1,300-card capacity stacker. The Extended BCD Interchange Code (256 codes) is punched. Card Image (#1531) is required to punch binary codes ... see "Special Features".

**Card Limitations:** Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

**Internal Scores** (before separation): M-4, M-5, S-1, ID-1.

**External Scores** (after separation): M-7, M-11 (with round corners), CF-11 (with round corners) on either end, M-3 on column 80 end only.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

**Bibliography:** S/360 -- GC20-0360, S/370, 4300 -- GC20-0001

**SPECIFY**

- **Power (AC):**

<b>50 Hz (3-phase)</b>	<b>60 Hz (1-phase)</b>
200V #2807	208V #9902
220V #2815	230V #9904
235V #2818	
380V #2816	
408V #2819	

Must be consistent with system voltage.

- **Color:** #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- **Isolation, Control Unit:** May be required on units shipped prior to December 29, 1967 for mdls 44, 65, 67 and 75; January 28, 1968 for mdls 30, 40 and 50 ... see "Special Features".
- **Interconnection with Non-IBM Equipment:** #9995 for process line by other manufacturer, #9996 for no-process line.
- **Language Groups:** #2927 for English, #2928 for French, #2929 for German.
- **Dust Cover:** #2776.

**SPECIAL FEATURES**

**Card Image (#1531):** Permits punching of cards with multiple punching in a single column.

**Isolation, Control Unit (#4700):** [For field installation on units shipped prior to December 29, 1967 for mdls 44, 65, 67 and 75; January 28, 1968 for mdls 30, 40 and 50 ... standard on unit shipped after that] To turn power on or off the 1442 mdl N2 without generating spurious signals. Thus, a processor program, if it can be logically disconnected from the system before power is turned off, can continue operating. **Prerequisites:** Since in all case there are compatible EC level requirements, the concurrence of the Branch CE Manager is required for any order for this feature.

**MODEL CONVERSIONS** (None)

**ACCESSORIES** (None)

**SUPPLIES** (None)

## 1520 HAND-HELD SCANNER

### PURPOSE

A hand-held optical reader which attaches to the 3683 mdls 001, 002, and 003 and the 3684 mdls 001 and 002 in the 3650 and 3680 Programmable Store System and the 4683 mdls 001 and 002 in the 4680 Store System. It is particularly adaptable to all modes of checkout and it accommodates both standing and seated operators.

### MODELS

**Model A01:** For use with the 3650 and 3680 Programmable Store Systems. For use with the 4680 Store System via the Feature Cards B, C, or D.

**Model A02:** For use with the 4680 Store System.

**Maximum:** One per 3683, 3684, or 4683 Point of Sale Terminal

**Prerequisites:** On the 3683: special features #5422 Non-IBM Hand-Held OCR Reader Adapter and either #3880 Expansion Feature-I or #3881 Expansion Feature-II and user written application code. On the 3684: special features #5422 Non-IBM Hand-Held OCR Reader and #3890 Expansion Feature on the mdl 1 and user written application code.

On the 4683: If 1520-A01 is installed on the 4683 mdls 1 or 2, then Feature Cards B, C, or D (#4001, #4002, or #4003 respectively) and the OCR Hand-Held Reader Cable (#4024) are required. In addition customer written application code is required to convert the OCR formatted data received from the 1520 back to UPC data. If the 1520-A02 is installed on the 4683, there are no additional feature cards or programming required; however, the Distributed Keyboard Cable (#3326) is required.

**Customer Setup (CSU):** The 1520 is a customer setup unit. Detailed setup instructions are included with each unit.

**Patches Required to Support 1520-A01 on 3683 or 3684:** Select from the following the microcode patches required to install OLT 75 on your system.

EC 320502: SFO4286 and SFO4304

EC 320503: SFO5286 and SFO5304

EC 320560: SFO6286 and SFO6304

EC 320561: SFO7286 and SFO7304

EC 320562: SFO8286 and SFO8304

### HIGHLIGHTS

The 1520 consists of three units: (1) a power supply with a 1.83m (6 ft.) connecting cable to a (2) control unit/interface box and (3) a hand-held laser scanner which is 200mm (8 in.) long, 54mm (2.1 in.) wide and 180mm (7.1 in.) high. The hand-held scanner connects to the control unit/interface box via a 1.83m (6 ft.) curled cord. The 1520 mdl A01 scanner reads UPC regular (Version "A"), UPC zero suppression (Version "E"), EAN-13 and EAN-8 bar code symbols. The 1520 mdl A02 reads UPC regular (Version "A"), UPC zero suppression (Version "E"), EAN-13 and EAN-8, Code 39, and Interleaved Two-of-Five bar code symbols. The Hand-Held Scanner has a scan rate of approximately 36 scans per second and has an extended depth of field of up to 200mm (8.0 in.).

The 1520 is a Class IIa laser product which complies with the safety standards of the United States Department of Health, Education, and Human Services (Performance Standard for Laser Products - 21 CFR Subchapter J 1040.10).

The product reads the Universal Product Code (UPC) which has been adopted in the United States as an industry specification for supermarket item identification. It also reads the European Numbering (EAN) symbol which has been adopted in World Trade countries as an industry specification for merchandise identification. In addition to these codes, the 1520-A02 is also capable of reading Code 39 and Interleaved Two-of-Five bar codes used in receiving/carton marking.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup, and checkout of the 1520 at time of delivery or when relocating the 1520.
- Using and following the 1520 Problem Determination Procedures.

**Requirements:** The customer is required to return the hand-held reader, control unit, and power supply when maintenance service is to be performed. It is recommended that the customer maintain an adequate level of spare units in order to ensure continual system operation.

Copies of the UPC Symbol Specifications and the UPC Guidelines are available at a charge from the UPC Council to obtain copies, the customer should write to:

Uniform Product Code Council, Inc.  
7061 Corporate Way, Suite 106  
Dayton, Ohio 45459  
513-435-3870

For copies of the General Specifications for the Article Symbol Marking (EAN), the customer should write to:

Secrétaire General, E.A.N.  
Rue Des Colonies 54, BTE 8  
1000 Bruxelles, Belgique

For copies of the specifications for the Code 39 and Interleaved Two-of-Five bar codes, the customer should write to

The Material Handling Institute, Inc.  
1326 Freeport Road  
Pittsburgh, Pa. 15238  
412-782-1624

### SPECIFY

(Canada only > Unless otherwise indicated, these specific codes are only available at time of manufacture.

- Machine Nomenclature: Canadian English/French Canadian #2934 <)

### SPECIAL FEATURES (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

**2314 DIRECT ACCESS STORAGE  
FACILITY - MDL 1**

[NO LONGER AVAILABLE]

**PURPOSE**

Large capacity high-speed direct access storage and control for a S/360 mdl 30, 40, 50, 65, 75, 85, 195, or any S/370 processor except 3115, 3125, 3081, 3083, 3084, or 3090.

**MODELS**
**Model 1 001**
**Limitations:**

S/360 mdl 30 -- the 2314 requires a 1.5 microsecond 2030 and can be attached only to the first selector channel. Further, when the 2314 is attached, the second channel is restricted as to devices that may be attached ... see "Channel Control Capabilities" in M2030 pages. When a 2841 Control Unit and a 2314 are both attached to a 2030, both must be attached to the first selector channel. Because of the high data rate of the 2314 and the cycle-stealing concept of the selector channel, available program processing time is reduced during 2314 operations. This is of particular concern when handling time-dependent I/O devices, i.e., 1412, 1418, 1419, 1428. To determine the 2314 loading effect, refer to SRL, *S/360 Model 30 Channel Characteristics and Functional Evaluations* (GA24-3411).

S/360 mdl 40 -- the 2314 may be attached to either the first or second selector channel. However, 2314s may not be attached to both selector channels.

S/360 mdl 50 -- if the 2314 is to be used with a 2050 having 1410/7010 Compatibility (#4478), consult

**Prerequisites:** A control unit position on a system channel.

S/360 mdl 30, 40, 50 -- a special feature, selector channel ... see M2030, 2040, 2050 pages.

S/360 mdl 65, 75 -- a selector channel of 2860 ... see M2860 pages.

S/360 mdl 85, 195 or S/370 mdl 165, 168, 195 -- a selector channel of 2860, or a shared subchannel of a 2880 ... see M2860, 2880 pages.

S/370 mdl 135 -- selector channel (special feature) ... see M3135 pages.

S/370 mdl 135-3 -- block multiplexer channels (special features) ... see M3135-3 pages.

S/370 mdl 138 -- block multiplexer channels (standard) ... see M3138 pages.

S/370 mdl 145 -- selector channel (standard) ... see M3145 pages.

S/370 mdl 145-3 -- block multiplexer channels ... see M3145-3 pages.

S/370 mdl 148 -- block multiplexer channels (standard) ... see M3148 pages.

S/370 mdl 155, 158 -- block multiplexer channels ... see M3155, M3158 pages.

3031 or 3032 Processor -- block multiplexer channels (five are standard) ... see M3031 or 3032 pages.

3033 Processor -- block multiplexer channels (ten are standard) ... see M3033 pages.

Each disk storage module requires a 2316 Disk Pack ... these must be ordered separately ... see "Supplies".

**HIGHLIGHTS**

Has eight independent modules, each storing up to 29.17 million 8-bit bytes or 58.35 million packed decimal digits in a 2316 Disk Pack.

The eight removable and interchangeable 2316s provide a total of 233.4 million bytes of online storage and virtually unlimited offline storage. Minimum access is 25 milliseconds; average is 75 milliseconds; maximum is 135 milliseconds.

Standard features include:

File Scan -- for performing a comparison on selected bytes of file organization.

Record Overflow -- for greater utilization of storage. Enhanced system reliability and performance are achieved by provision of a ninth "spare" module for customer use should one of the eight normally addressed modules become inoperable.

**Cylinder Concept:** Retained in the 2314. One cylinder has 20 tracks. Up to 7,294 bytes (or 14,588 packed decimal digits) on each track,

provide 145,880 bytes (or 291,760 packed decimal digits) per cylinder, available under each of the eight access mechanisms.

Data transmission is at the rate of 312,000 bytes/second ... with packed decimal, the rate is 624,000 digits/second.

An advanced method of utilizing disk storage. Self-formatting tracks allow variable length identifiers and records to be easily handled.

**Command Chaining:** Multiple records within a cylinder can be read/written by a sequence of channel commands without rotational delays between records ... permits index and directory searches without processor intervention. The command structure is optimized to yield efficient random or sequential processing with either randomly or sequentially organized data files. The ability to protect "logical" files is provided by the combination of commands in the 2314 and checks within the control programs servicing the file system. Cyclic code and bit count checking are used to assure the integrity of stored data. The controls necessary to attach the unit to a system channel are included in the 2314.

**Publications:** Bibliographies; S/360 (GC20-0360), S/370 (GC20-0001)

**SPECIFY**

- Each 2314 DASD mdl 1 is to be specified on a DPMO as follows: [1] One 2314 mdl 001, [2] One 2312 mdl 001, and [3] Two 2313 mdl 001s ... on one of the 2313s also specify #9140 (to indicate the 2313 at the end of the 2314 DASD).

**Note:** The 2312 and 2313 type numbers and their associated feature codes are to be specified at no charge and are to be used only for internal IBM ordering and control purposes. List each type and mdl (2314, 2312, 2313) separately with all its associated feature codes. The 2312 and 2313 type numbers should never appear on any agreement.

- Power (AC, 3-phase):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Color: [2314 only] #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray.
- Additional Codes: On the 2312 and 2313s, additional codes are required depending upon special features on the 2314 and 2844 Auxiliary Storage Control ... see "Special Features" below.
- 2316 Disk Packs: 2316s are required and must be ordered separately ... see M2316 pages.
- Isolation Feature: May be required on units shipped prior to December 29, 1967 ... see "Special Features".
- Language Groups: Specify #2927 for English, #2928 for French, #2929 for German.

**SPECIAL FEATURES**

The following special features are on an "as available" basis for field installation.

**Isolation, Control Unit (#4700):** [For field installation on units shipped prior to December 29, 1967 ... standard on units shipped after that] To turn power on or off the 2314 without generating spurious signals. Thus, if the 2314 can be logically disconnected from the system, the CPU program can continue operating. **Prerequisites:** Because in all cases there are compatible EC level requirements, the concurrence of the branch CE manager is required for any order for this feature.

**Remote Switch Attachment (#8148):** To attach the Two Channel Switch (#8170) to a 2167 Configuration Control Unit in a S/360 mdl 67-2, or to a S/360 mdl 65MP which has the Configuration Control Panel (#1505) installed, or to a S/370 mdl 158MP or 168MP. **Prerequisites:** Specify #9500 on the 2312. #9500 can be field installed.

**2844 Attachment (#7949):** To attach a 2844 Auxiliary Storage Control. **Note:** Order this feature only when a 2844 is to be attached. Installation of the feature without concurrent installation of the 2844 renders the 2314 inoperative. **Maximum:** One. **Prerequisites:** Specify #9750 on the 2312 and each 2313 ... if the 2844 has a Two Channel Switch

**2314 Direct Access Storage  
Facility - MDL 1 (cont'd)**

(#8171), also specify **#9765** on the 2312 ... if the 2844 has a Remote Switch Attachment (#6150) also specify **#9510** on the 2312. **#9750**, **#9765** and **#9510** can be field installed.

**Two Channel Switch (#8170):** To attach the 2314 to a second channel. Switching is under program control. Includes partitioning. **Prerequisites:** Specify **#9760** on the 2312 ... **#9760** can be field installed. If the two channel switch is routed through the Configuration Control Panel (#1505) of a multiprocessing S/360 mdl 65, #6148 is required. Also, in a S/360 mdl 67-2, a S/370 mdl 158MP or 168MP, #6148 is required. See #6148 above.

**MODEL CONVERSIONS (None)****ACCESSORIES (None)****SUPPLIES**

**Disk Packs:** Contact IBM. See M2316 pages.

**2700 GENERAL****TERMINOLOGY**

In these pages, the term "Data Terminal Equipment" and its abbreviation "DTE" will mean any business machine which has a telecommunications capability, be it a terminal, a multiplexer or a processor with an integrated communications adapter.

Also, the term "Data Circuit-terminating Equipment" and its abbreviation "DCE" will mean any equipment whose function it is to convert DTE signals into a form suitable for transmission over a communication facility, and to convert signals received from a communications facility into a form suitable for transfer to a DTE. This DCE may be a modem (a MODulator/DEModulator), a telegraph line adapter or another type of signal conversion equipment.

Finally, the term "Automatic Calling Equipment" and its abbreviation "ACE" will mean that equipment which will accept dial digits from a DTE and present them to the telephone central office for the purpose of effecting a switched network connection.

**ORGANIZATION**

These pages are organized into intercommunication charts, which are:

- Chart 1 - IBM Start/Stop DTE Intercommunication Capability Table
- Chart 2 - IBM Binary Synchronous DTE Intercommunication Capability Table
- Chart 3 - IBM Synchronous Data Link Control DTE Intercommunication Capability Table

And there are communication facility charts:

- Chart A - Nonswitched Telegraph Lines
- Chart C - The Public Switched Telephone Network
- Chart D - Nonswitched Voice Grade Lines
- Chart E - Nonswitched Wideband Channels
- Chart G - Nonswitched Limited Distance Baseband Channels (including Customer-Owned and Maintained, COAM, lines)
- Chart K - Public Switched Data Networks Providing a "V" Series Interface
- Chart L - Public Switched Data Networks Providing an "X" Series Interface
- Chart M - Nonswitched Data Networks Providing a "V" Series Interface
- Chart N - Nonswitched Data Networks Providing an "X" Series Interface
- Chart P - Public Packet Switched Networks Providing a CCITT X.21bis (Canada only > (EIA RS-232-C) <) (Except Canada > (CCITT V.24/V.28 or V.35) <) Interface
- Chart Q - Public Packet Switched Networks Providing a CCITT X.21 Interface

**USE**

To use these pages:

Refer to the appropriate intercommunication chart to find the desired DTEs and to determine if they are capable of intercommunication. If they are so capable, read the alphabetic designations for the classes of facility over which they may communicate.

Refer to the charts for the facility classes indicated to find the particular facility and the required feature codes for the DTEs that will allow their intercommunication.

Refer to the individual machine pages for the DTEs to determine prerequisites, restrictions, etc.

For example, assume that communication between a 3101 and a 3705-II is desired. Since this would be in start/stop mode, the first reference would be to Chart 1. In Chart 1, the 3101 entry shows that communication between a 3101 and a 3705-II is possible over Facility classes C and D. The 3705-II entry confirms that communication with a 3101 over these facility classes is possible.

Reference to the C and D Facility Charts shows that, since feature codes are entered for both the 3101 and the 3705-II, communication between them is possible over Facilities (Canada only > C1M, C2M, D1M, D2M and D3M. <) (Except Canada > C1, D1, D2 and D3. <)

Further, the C and D Facility Charts show, for both the 3101 and the 3705-II, the feature codes required on each to allow this intercommunication.

Finally, reference should be made to the M3101 and 3705 pages to assure that any restrictions, prerequisites, etc., to the installation of the indicated features are satisfied.

**STANDALONE DCEs**

The only standalone DCEs listed in the Facility Charts are:

- the IBM standard product line modems available, and those (Canada only > Common Carrier services in which the use of a Common Carrier <) (Except Canada > PTT services in which the use of a PTT <) provided modem is mandatory.

Standalone DCEs other than these may be attached to IBM DTEs, but such attachment (other than that of the IBM Special Product Modems) is always under the provisions of the IBM Multiple Supplier Systems Policy (see the GI Section for information on this Policy).

**CUSTOMER RESPONSIBILITIES**

The customer must be advised in writing that the customer's responsibilities include:

- Making arrangements for price quotations, installation and initial and recurring costs of the (Canada only > Common Carrier <) (Except Canada > PTT <) supplied communication facility/service appropriate to his desired speed of operation.
- When operation is planned on the public switched telephone network, obtaining, prior to the processing of the machine orders, assurance from the (Canada only > Common Carrier <) (Except Canada > PTT <) that facilities of the proper quality to support data transmission will be available between the proposed locations.
- Toll charges incurred in the installation and maintenance of the IBM equipment.
- Relinquishing the system for service in those cases in which servicing aids and/or available error printouts do not permit localization of the malfunction to the communication facility or terminal location.
- The DTE/DCE compatibility and the DTE/ACE compatibility when the DCE and/or ACE is not specifically listed as supported in the Facility Charts.
- When using IBM Modems, Line Adapters or Integrated Modems, it is recommended that the customer investigate the

economics of providing alternate voice service to facilitate installation and maintenance.

- Performing the setup procedures for customer setup products. On these products, the customer is also responsible for following the problem determination procedures and recovery routines furnished by IBM should a problem arise in the setup.
- The security of customer data is a customer responsibility. The customer is responsible for the selection, implementation, and adequacy of these products in the protection of his data. For applications in which sensitive data is sent over external communication facilities, the customer may wish to apply cryptography.
- Because of the characteristics of the teleprocessing environment, it is possible that in some very unusual circumstances the throughput anticipated on a specific network configuration will not be achieved. The probability is more likely at the higher transmission rates. Actions which the customer may initiate if the anticipated throughput is not achieved are:
  - Addition of line conditioning by the telecommunications common carrier.
  - Redialing the connection if operating on the public switched telephone network.
  - Adjusting, where possible, the block size to optimize throughput, based on the error characteristics of the particular channel.
  - Requesting the (Canada only > Common Carrier <) (Except Canada > PTT <) to provide alternate routing or line improvements. This is normally provided at extra cost. The (Canada only > Common Carrier <) (Except Canada > PTT <) should be contacted for further details.

However, it is possible that, at a particular location, only lower speed operation is obtainable.

The customer should be informed that his local IBM representative is available to assist him in analyzing and planning for these alternatives.

- Finally, the Marketing Representative must have the customer obtain a firm installation date for the start of transmission service prior to processing the OC card.

## MULTIPOINT OPERATION

Duplex communication facilities are required for multipoint systems in which:

- The DCE at the control station is a 1200 bps integrated modem, or
- It is desired that a continuous carrier be maintained from the control station to eliminate the control station "Ready For Sending" delays.

The use of duplex facilities and operation in the continuous carrier mode is strongly recommended, since operation in a non-continuous carrier mode (by the control station) will subject the system to inordinate delays, particularly in the polling and addressing sequences.

## IBM DATA TERMINAL AND DATA CIRCUIT-TERMINATING EQUIPMENT

The following is a list, by machine type number, of the IBM DTEs and DCEs covered in these pages. This list includes, for the DTEs, a reference to the applicable Intercommunication Chart (1, 2 or 3), and, for both the DTEs and DCEs, a reference to the responsible Marketing divisions.

**2701 Data Adapter Unit:** Charts 1, 2, Mktd by ISG, E/ME/A, AG-A/PG.

**3101 Display Terminal:** Chart 1, Mktd by ISG, E/ME/A, AG-A/PG.

**3138 Processing Unit (S/370 model 138):** Charts 1, 2, Mktd by ISG, E/ME/A, AG-A/PG.

**3161 Display Station:** Chart 1, Mktd by ISG, AG-A/PG

**3163 Display Station:** Chart 1, Mktd by ISG, AG-A/PG

**(Except Japan > 3232-1 Keyboard Printer Terminal:** Chart 3, Mktd by ISG, AG-A/PG <)

**3274 Control Unit:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3276 Control Unit Display Station:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3602 Finance Communication Controller:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3603 Terminal Attachment Unit:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3624 Consumer Transaction Facility:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3631 Plant Communication Controller:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3632 Plant Communication Controller:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3651 Store Controller:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3659 Remote Communication Unit:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3669 Store Communication Unit:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3684 Point Of Sale - Control Unit:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**(Canada only > 3689 Store Communications Unit:** Charts 2 and 3, Mktd by ISG, AG-A/PG. <)

**(Canada and Japan only > 3694 Document Processor:** Chart 3, Mktd by ISG, AG-A/PG. <)

**3704 Communications Controller:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3705-II Communications Controller:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**80 Communications Controller:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3708 Network Conversion Unit:** Charts 1, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3710 Network Gateway:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3720 Communication Controller:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3721 Expansion Unit:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3720, 3721, 3725-1, 2 Communication Controller:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**3726 Communication Controller Expansion:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG. 3741 Data Station/Programmable Work Station Chart 2, Mktd by ISG, E/ME/A, AG-A/PG

**3771 Communication Terminal:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

## MACHINES

- 3774 Communication Terminal:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3775 Communication Terminal:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3776 Communication Terminal:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3777 Communication Terminal:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3791 Controller (3790 Communication System):** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3843 Loop Control Unit:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3845 Data Encryption Device:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3846 Data Encryption Device:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 3863 Modem:** Charts C, D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3864 Modem:** Charts C, D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3865 Modem:** Chart D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3868-1,2 Rack-Mounted Modem:** Chart D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3868-3,4 Rack-Mounted Modem:** Chart D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3872 Modem:** Charts C, D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3874 Modem:** Charts C, D, Mktd by ISG, E/ME/A, AG-A/PG.
- 3945 Telegraph Line Termination:** Chart A, Mktd by E/ME/A, AG-A/PG.
- 3976 Modem:** Charts C, D, Mktd by E/ME/A, AG-A/PG.
- 3977 Modem:** Chart D, Mktd by E/ME/A, AG-A/PG.
- 4331 Processor:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4361 Processor:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4701-1, 2, 3 Finance Communication Controller:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4702 Branch Automation Processor:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4730 Personal Banking Machine:** Charts 2,3, Mktd by ISG, AG-A/PG.
- 4736 Personal Banking Machine:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4952 Processor (Series/1):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4954 Processor (Series/1):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4955 Processor (Series/1):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4956 Processor (Series/1):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4959 Input/Output Expansion Unit (Series/1):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4965 Diskette Drive and I/O Expansion Unit (Series/1):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 4975-1R, 2R Printer (Series/1):** Charts 1, 2, Mktd by ISG, E/ME/A, AG-A/PG.
- 4987 Programmable Communication Subsystem (Series/1):** Charts 1, 2, Mktd by ISG, E/ME/A, AG-A/PG.
- 5110 Computer:** Charts 1, 2, Mktd by ISG, E/ME/A, AG-A/PG.
- (Canada only > 5150/5160 IBM Personal Computer:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG. <)
- 5208-001 ASCII-5250 Link Protocol Converter:** Chart 1, Mktd by ISG, E/ME/A, AG-A/PG.
- 5231 Controller (5230 Data Collection System):** Chart 2, Mktd by ISG, E/ME/A, AG-A/PG.
- 5251 Display Station:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5265 Point Of Sale Terminal:** Chart 2, Mktd by ISG, E/ME/A, AG-A/PG.
- 5285 Programmable Data Station (5280 Distributed Data System):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5288 Programmable Control Unit (5280 Distributed Data System):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5294 Remote Control Unit:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5340 System Unit (System/34):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5360 System Unit (System/36):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5362 System Unit (System/36):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5364 System Unit (System/36):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5381/5382 System Unit (System/38):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 5525 System Unit (5520 Administrative System):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 6360 Diskette Unit (Displaywriter):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 6580 Display Station (Displaywriter):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 6670 Information Distributor:** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- (Canada only > 6733 Typewriter Communication Module:** Chart 1, Mktd by ISG, AG-A/PG. <)
- 7426 Terminal Interface Unit:** Charts 1, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 8101 Storage and I/O Unit (8100 Information System):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 8130 Processor (8100 Information System):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 8140 Processor (8100 Information System):** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.
- 8150 Processor (8100 Information System):** Charts 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**MACHINES**

**8550 System Unit (Personal System/2):** Charts 1, 3, Mktd by ISG, E/ME/A, AG-A/PG

**8560 System Unit (Personal System/2):** Charts 1, 3, Mktd by ISG, E/ME/A, AG-A/PG

**8580 System Unit (Personal System/2):** Charts 1, 3, Mktd by ISG, E/ME/A, AG-A/PG

**8775 Display Terminal:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.

**8815 Scanmaster I:** Chart 3, Mktd by ISG, E/ME/A, AG-A/PG.

**9373 Processor:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**9375 Processor:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

**9377 Processor:** Charts 1, 2, 3, Mktd by ISG, E/ME/A, AG-A/PG.

## MACHINES

### CHART 1 - START/STOP INTERCOMMUNICATIONS

For each machine type, the machine types that it will communicate with are shown, as well as the facility classes over which the communication can occur are shown.

#### (Except Canada > 2701:

- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 6360, 6580

C, D

- TTY

A

#### 3101:

- 3704, 3705-II, 80, 3708, 3710, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 7426, 9373, 9375, 9377

C, D

- 8101, 8130, 8140

D

#### 3138:

- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580

C, D

#### 3161, 3163:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4959, 4965, 7426, 9373, 9375, 9377

C, D

- 8101, 8130, 8140

D

#### 3164:

- 3720, 3721, 9373, 9375, 9377

C, D

#### 3704:

- 3101, 3161, 3163, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580

C, D

- TTY

A

#### 3705-II:

- 3101, 3161, 3163, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580, 8550, 8560, 8580

C, D

- TTY

A

#### 3705-80:

- 3101, 3161, 3163, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580

C, D

#### 3708:

- 3101

C, D

#### 3710:

- 3101, 3161, 3163, 5150

C, D

#### 3720, 3721:

- 3101, 3161, 3163, 3164, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5150, 5160, 6360, 6580

C, D

- TTY

A

#### 3725-1, 2, 3726:

- 3101, 3161, 3163, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 6360, 6580

C, D

- TTY

A

#### 3845, 3846:

- 3845, 3846

C, D

#### 4331, 4361:

- 3161, 3163, 5110, 6360, 6580

C, D

#### 4952, 4954, 4955, 4956, 4959, 4965:

- 2701, 3101, 3138, 3161, 3163, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726

C, D

- 4975-1R, 2R

D

#### 4975-1R, 2R:

- 4952, 4954, 4955, 4956, 4959, 4965

D

#### 4987:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726

C, D

#### 5110 (1):

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361

C, D

#### 5150:

- 3710, 9373, 9375, 9377

C, D

## MACHINES

### 5160, 5170:

- 9373, 9375, 9377
- C, D

### 5208:

- 3101, 3151, 3161, 3163, 3164
- C, D

### 6360, 6580:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 6360, 6580
- C, D

### 7426:

- 3101, 3161, 3163
- C, D

### 8101, 8130, 8140:

- 3101, 3161, 3163
- D

### 8550, 8560, 8580:

- 3705-II
- C, D

### 9373, 9375, 9377:

- 3101, 3161, 3163, 3164, 5150, 5160, 5170
- C, D
- TWX 33/35
- C

### TTY (2):

- 2701, 3704, 3705-II, 3720, 3721, 3725-1, 2, 3726
- A

### TWX 33/35:

- 9373, 9375, 9377
- C

### Notes for Chart 1:

1. The 5110 will communicate in point-to-point mode only.
2. The TTY terminals referred to are teleprinters using a CCITT #2 or #5 code. < )

### (Canada only > 2701:

- 4952, 4954, 4955, 4956, 4959, 4965, 4987
- C, D, K
- 6360, 6580
- C, D
- TTY
- A
- TWX 33/35

C

### 3101:

- 3704, 3705-II, 80, 3708, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 7426, 9373, 9375, 9377
- C, D
- 8101, 8130, 8140
- D

### 3138:

- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110
- C, D, K, M
- 6360, 6580, 6733
- C, D
- TWX 33/35
- C

### 3161, 3163:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 7426, 9373, 9375, 9377
- C, D
- 8101, 8130, 8140
- D

### 3164:

- 3720, 3721, 9373, 9375, 9377
- C, D

### 3704:

- 3101, 3161, 3163, 6360, 6580
- C, D
- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110
- C, D, K, M
- TTY
- A
- TWX 33/35/37
- C

### 3705-II:

- 3101, 3161, 3163, 6360, 6580, 6733, 8550, 8560, 8580
- C, D
- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110
- C, D, K, M
- TTY
- A
- TWX 33/35/37
- C

### 3705-80:

- 3101, 3161, 3163, 6360, 6580, 6733
- C, D

## MACHINES

- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110

C, D, K, M

- TWX 33/35/37

C

### 3708:

- 3101

C, D

- TWX 33/35

C

### 3710:

- 3101, 3161, 3163, 5150

C, D

- TWX 33/35

C

### 3720, 3721

- 3101, 3161, 3163, 3164, 6360, 6580

C, D

- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110

C, D, K, M

- TWX 33/35/37

C

- TTY

A

### 3725-1, 2, 3726:

- 3101, 3161, 3163, 6360, 6580,

C, D

- 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110

C, D, K, M

- TWX 33/35/37

C

- TTY

A

### 3845, 3846:

- 3845, 3846

C, D

### 4331, 4361:

- 5110

C, D, K, M

- 3101, 4331, 4361, 6360, 6580, 6733

C, D

- TWX 33/35

C

### 4952, 4954, 4955, 4956, 4959, 4965:

- 2701

C, D, K

- 3101, 3161, 3163, 6733

C, D

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726

C, D, K, M

- 4975-1R, 2R

D

### 4975-1R, 2R:

- 4952, 4954, 4955, 4956, 4959, 4965

D

### 4987:

- 2701

C, D, K

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726

C, D, K, M

- 6733

C, D

### 5110 (1):

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361

C, D, K, M

### 5150:

- 3710, 9373, 9375, 9377

C, D

### 5208:

- 3101, 3151, 3161, 3163, 3164

C, D

### 6360, 6580:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 6360, 6580, 6733

C, D

- TWX 33/35

C

### 6733:

- 3138, 3705-II, 80, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 6360, 6580, 6733

C, D

### 7426:

- 3101, 3161, 3163

C, D

**MACHINES**

**8101, 8130, 8140:**

- 3101, 3161, 3163  
D

**8550, 8560, 8580**

- 3705-II  
C, D

**9373, 9375, 9377:**

- 3101, 3161, 3163, 3164, 5150, 5160, 5170  
C, D
- TWX 33/35  
C

**TTY (2):**

- 2701, 3704, 3705-II, 3720, 3721, 3725-1, 2, 3726  
A

**TWX 33/35:**

- 2701, 3138, 3704, 3705-II, 80, 3708, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 6360, 6580, 9373, 9375, 9377  
C

**TWX 37:**

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726  
C

**Notes for Chart 1:**

1. The 5110 will communicate in point-to-point mode only.
2. The TTY terminals referred to are Telco Type 82B3 or 83B3 terminals or Western Union Plan 115 terminals. < )

## MACHINES

### CHART 2 - BSC INTERCOMMUNICATIONS

For each machine type, the machine types that it will communicate with are shown, as well as the facility classes over which the communication can occur are shown.

(Except Canada > 2701:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 9373, 9375, 9377

C, D, E, G, K, M

- 3138, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4987, 5231, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 6670

C, D, G, K, M

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730

D, G, M

- 6360, 6580

C, D, G

#### 3138:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 9373, 9375, 9377

C, D, G, K, M

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730, 8101, 8130, 8140, 8150

D, G, M

- 6360, 6580

C, D, G

#### 3174-01R, 02R, 51R, 52R:

- 9373, 9375, 9377

D, G, M

#### 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4:

- 2701, 3138, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

D, G, M

#### 3624:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726

D, G, M

#### 3651-25, 50:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

#### 3651-60:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, K

#### 3651-75:

- 3651-75, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

#### 3684:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

#### 3694:

- 3704, 3705-II, 80, 4331, 4361

C, D, G, K, M

#### 3704:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377

C, D, E, G, K, M

- 3138, 3651-25, 50, 75, 3684, 3694, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5364, 5381, 5382, 5525, 6670

C, D, G, K, M

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 3624, 8101, 8130, 8140, 8150

D, G, M

- 3651-60

C, K

- 6360, 6580

C, D, G

#### 3705-II:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377

C, D, E, G, K, M

- 3138, 3651-25, 50, 75, 3684, 3694, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5364, 5381, 5382, 5525, 6670

C, D, G, K, M

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150

D, G, M

- 3651-60

C, K

- 3812

D

- 6360, 6580

C, D, G

#### 3705-80:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377

C, D, E, G, K, M

- 3138, 3651-25, 50, 75, 3684, 3694, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5364, 5381, 5382, 5525, 6670

C, D, G, K, M

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150  
D, G, M
- 3651-60  
C, K
- 3812  
D
- 6360, 6580  
C, D, G

**3710:**

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4  
D, G, M
- 3776-1, 2, 3777-1  
C, D, G, K, M

**3720, 3721:**

- 2701, 3704, 3705-11, 80, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377  
C, D, E, G, K, M
- 3188, 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5381, 5382, 5525, 6670  
C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150  
D, G, M
- 3651-60  
C, K
- 3812  
D
- 6360, 6580  
C, D, G

**3725-1, 2, 3726:**

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377  
C, D, E, G, K, M
- 3138, 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5381, 5382, 5525, 6670  
C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150  
D, G, M
- 3651-60  
C, K
- 3812  
D
- 6360, 6580

C, D, G

**3741:**

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377  
C, D, G, K, M

**3747:**

- 5364  
C, D, G, K, M

**3771, 3774, 3775, 3777-2:**

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M

**3776-1, 2, 3777-1:**

- 2701, 3138, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5381, 9373, 9375, 9377  
C, D, G, K, M

**3812:**

- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
D

**3845, 3846:**

- 3845, 3846  
C, D

**4321:**

- 5364  
C, D, G, K, M

**4331, 4361:**

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377  
C, D, E, G, K, M
- 3138, 3651-25, 50, 75, 3684, 3694, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5150, 5160, 5231, 5265, 5285, 5288, 5340, 5364, 5381, 5382, 5525, 6670  
C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730, 8101, 8130, 8140, 8150  
D, G, M
- 3651-60  
C, K
- 3812  
D
- 6360, 6580  
C, D, G

**4701-1, 2, 3, 4702:**

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

## MACHINES

C, D, G, K, M

### 4730:

- 2701, 3138, 3704, 3705-II, 3705-80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

D, G, M

### 4952, 4954, 4955, 4956, 4959, 4965:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362, 9373, 9375, 9377

C, D, E, G, K, M

- 3138, 4987, 5265, 5285, 5288, 5340, 5364, 5381, 5382

C, D, G, K, M

- 4975-1R, 2R

D

### 4975-1R, 2R:

- 4952, 4954, 4955, 4956, 4959, 4965

D

### 4987:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5340, 5360, 5362, 5364, 9373, 9375, 9377

C, D, G, K, M

### 5110:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5150, 5160:

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

### 5231:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 5110, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5265:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5285, 5288:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5340:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5231, 5265, 5285, 5288, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

- 5340, 5360, 5362

C, D, G, K, L, M, N

### 5360, 5362:

- 2701, 3138, 3741, 4987, 5110, 5231, 5265, 5285, 5288, 5364, 5381, 5382, 5525, 6670

C, D, G, K, M

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 9373, 9375, 9377

C, D, E, G, K, M

- 5340

C, D, G, K, L, M, N

- 5360, 5362

C, D, E, G, K, L, M, N

- 6360, 6580

C, D, G

### 5384:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 3747, 4321, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377

C, D, G, K, M

- 5360, 5364

C, D, G

### 5381, 5382:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 3776-1, 2, 3777-1, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5525:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5360, 5362, 5364, 6670, 9373, 9375, 9377

C, D, G, K, M

- 6360, 6580

C, D, G

### 6360, 6580:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5360, 5362, 5364, 5525, 6360, 6580, 9373, 9375, 9377

C, D, G

### 6670:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5360, 5362, 5364, 5525, 6670, 9373, 9375, 9377

C, D, G, K, M

### 8101, 8130, 8140, 8150:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

D, G, M

**9373, 9375, 9377:**

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5360, 5362  
C, D, E, G, K, M
- 3138, 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4701-1, 2, 3, 4702, 4987, 5110, 5150, 5160, 5170, 5231, 5265, 5285, 5288, 5340, 5364, 5381, 5382, 5525, 6670  
C, D, G, K, M
- 3174-01R, 02R, 51R, 52R, 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730, 8101, 8130, 8140, 8150  
D, G, M
- 3651-60  
C, K
- 3812  
D
- 6360, 6580  
C, D, G < )

**(Canada only > 2701:**

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340  
C, D, E, G, K, M
- 3138, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4987, 5231, 5285, 5288, 5360, 5362, 5364, 5381, 5382, 6670, 9373, 9375, 9377  
C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730  
D, G, M
- 6360, 6580  
C, D, G

**3138:**

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 9373, 9375, 9377  
C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730, 8101, 8130, 8140, 8150  
D, G, M
- 3689  
C
- 6360, 6580  
C, D, G

**3174-01R, 02R, 51R, 52R:**

- 9373, 9375, 9377  
D, G, M

**3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4:**

- 2701, 3138, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

**D, G, M**

**3624:**

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726

**D, G, M**

**3651-25, 50:**

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

**C, D, G, K, M**

**3651-60:**

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

**C, K**

**3651-75:**

- 3651-75, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

**C, D, G, K, M**

**3684:**

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

**C, D, G, K, M**

**3689:**

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

**C**

**3704:**

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340

**C, D, E, G, K, M**

- 3138, 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377

**C, D, G, K, M**

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150

**D, G, M**

- 3651-60

**C, K**

- 3689

**C**

- 6360, 6580

**C, D, G**

**3705-II:**

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340

**C, D, E, G, K, M**

- 3138, 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265,

## MACHINES

- 5285, 5288, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377
- C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150
- D, G, M
- 3651-60
- C, K
- 3689
- C
- 3812
- D
- 6360, 6580
- C, D, G
- 3705-80:**
- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340
- C, D, E, G, K, M
- 3138, 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377
- C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150
- D, G, M
- 3651-60
- C, K
- 3689
- C
- 3812
- D
- 6360, 6580
- C, D, G
- 3710:**
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4
- D, G, M
- 3776-1, 2, 3777-1
- C, D, G, K, M
- 3720, 3721:**
- 2701, 3704, 3705-II, 80, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340
- C, D, E, G, K, M
- 3138- 3651-25, 50, 75, 3684, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4987, 5110, 5231, 5265, 5285, 5288, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377
- C, D, G, K, M
- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 3624, 4730, 8101, 8130, 8140, 8150
- D, G, M
- 3651-60
- C, K
- 3689
- C
- 3812
- D
- 6360, 6580
- C, D, G
- 3741:**
- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377
- C, D, G, K, M
- 3771, 3774, 3775, 3777-2:**
- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
- C, D, G, K, M
- 3776-1, 2, 3777-1:**
- 2701, 3138, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5381, 5382, 9373, 9375, 9377
- C, D, G, K, M
- 3812:**
- 3705-II, 80, 3720, 3721, 3725-1, 2, 4321, 4331, 4361, 9373, 9375, 9377
- D

## MACHINES

### 3845, 3846:

- 3845, 3846  
C, D

### 4331, 4361:

- 2701, 3138, 3651-25, 50, 75, 3684, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 3771, 3774, 3775, 3776-1, 2, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5150, 5160, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377

C, D, G, K, M

- 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730, 8101, 8130, 8140, 8150

D, G, M

- 3651-60

C, K

- 3689

C

- 3812

D

- 6360, 6580

C, D, G

### 4701-1, 2, 3, 4702:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

### 4730:

- 2701, 3138, 3704, 3705-II, 3705-80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

D, G, M

### 4952, 4954, 4955, 4956, 4959, 4965:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340, 5360, 5362

C, D, E, G, K, M

- 3138, 4331, 4361, 4987, 5265, 5285, 5288, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

- 4975-1R, 2R

D

### 4975-1R, 2R:

- 4952, 4954, 4955, 4956, 4959, 4965

D

### 4987:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5340, 5360, 5362, 5364, 9373, 9375, 9377

C, D, G, K, M

### 5110:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5150, 5160:

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

### 5231:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 5110, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5265:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5285, 5288:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5340:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4952, 4954, 4955, 4956, 4959, 4965, 5340

C, D, E, G, K, M

- 3138, 3741, 4331, 4361, 4987, 5110, 5231, 5265, 5285, 5288, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5360, 5362:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5525, 6670, 9373, 9375, 9377

C, D, G, K, M

- 4952, 4954, 4955, 4956, 4959, 4965

C, D, E, G, K, M

- 6360, 6580

C, D, G

### 5364:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 6670, 9373, 9375, 9377

C, D, G, K, M

- 6360, 6580

C, D, G

## MACHINES

### 5381, 5382:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3741, 3776-1, 2, 3777-1, 4331, 4361, 4952, 4954, 4955, 4956, 4959, 4965, 5110, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 9373, 9375, 9377

C, D, G, K, M

### 5525:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5360, 5362, 5364, 6670, 9373, 9375, 9377

C, D, G, K, M

- 6360, 6580

C, D, G

### 6360, 6580:

- 2701, 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5360, 5362, 5364, 5525, 6360, 6580, 9373, 9375, 9377

C, D, G

### 6670:

- 2701, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5360, 5362, 5364, 5525, 6670, 9373, 9375, 9377

C, D, G, K, M

### 8101, 8130, 8140, 8150:

- 3138, 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

D, G, M

### 9373, 9375, 9377:

- 2701, 3138, 3651-25, 50, 75, 3684, 3704, 3705-II, 80, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 3741, 3771, 3774, 3775, 3776-1, 3777-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5110, 5150, 5160, 5170, 5231, 5265, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 6670

C, D, G, K, M

- 3174-01R, 02R, 51R, 52R, 3274-1C, 21C, 31C, 51C, 3276-1, 2, 3, 4, 4730, 8101, 8130, 8140, 8150

D, G, M

- 3651-60

C, K

- 3689

C

- 3812

D

- 6360, 6580

C, D, G (<)

## CHART 3 - SNA/SDLC INTERCOMMUNICATIONS

For each machine type, the machine types that it will communicate with are shown, as well as the facility classes over which the communication can occur are shown.

### (Except Japan > 3232-1:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361  
C, D, G
- 8101, 8130, 8140, 8150  
D, G <)

### (Except Canada > 3174-1R:

- 9373, 9375, 9377  
D, E, G, M, N, P

### 3174-51R:

- 9373, 9375, 9377  
C, D, G, K, M, N, P

### 3274-1C:

- 3704  
D, E, G, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
D, E, G, M, N, P

### 3274-21C, 31C:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
D, E, G, M, N

### 3274-51C:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726  
C, D, G, K, L, M, N, P
- 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N, P
- 8101, 8130, 8140, 8150  
D, G, M, N

### 3274-52C:

- 3704  
D, G, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 8101, 8130, 8140, 8150, 9373, 9375, 9377  
D, G, M, N

### 3276-1, 2, 3, 4:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, P

- 3791  
D, G, M
- 8101, 8130, 8140, 8150  
D, G, M

### 3276-11, 12, 13, 14:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726  
C, D, G, K, L, M, N, P
- 3791  
D, G, M
- 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N, P
- 8101, 8130, 8140, 8150  
D, G, M, N

### 3602:

- 3603\*  
D, G
- 3624\*  
D, G, M
- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726  
C, D, G, K, L, M, N, P
- 4321, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N, P
- 8101, 8130, 8140, 8150  
D, G, M, N

\* This communication is not SNA/SDLC, but via a "B-Loop"

### 3603:

- 3602\*, 4701-1, 2\*, 3, 4702  
D, G

\* This communication is not SNA/SDLC, but via a Banking Loop

### 3624:

- 3602\*, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2\*, 3, 4702, 9373, 9375, 9377  
D, G, M

\* This communication is not SNA/SDLC, but via a Banking Loop

### 3631, 3632:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M

## MACHINES

- 3843  
D, G
- 8101, 8130, 8140, 8150  
D, G, M

### 3651-25:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
- 8101, 8130, 8140, 8150  
D, G, M

### 3651-50:

- 3659\*  
D, G
  - 3704  
C, D, G, K, M
  - 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
- \* This communication is not SNA/SDLC, but via an "S-Loop"

### 3651-60:

- 3669\*  
C
  - 3704  
C, K
  - 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, K, P
- \* This communication is not SNA/SDLC, but via an "S-Loop"

### 3651-75:

- 3651-75, 3704  
C, D, G, K, M
  - 3659\*  
D, G
  - 3669\*  
C
  - 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
  - 8101, 8130, 8140, 8150  
D, G, M
- \* This communication is not SNA/SDLC, but via an "S-Loop"

### 3659:

- 3651-50\*, 75\*  
D, G
- \* This communication is not SNA/SDLC, but via an "S-Loop"

### 3669:

- 3651-60\*, 75\*, 3669\*, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C
- \* This communication is not SNA/SDLC, but via an "S-Loop"

### 3684:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
- 8101, 8130, 8140, 8150  
D, G, M

### 3694:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M

### 3704: <)

- (Except Japan > 3232-1  
C, D, G <)
- (Except Canada > 3274-52C, 3624, 4730, 4736  
D, G, M
- 3274-1C  
D, E, G, M
- 3274-21C, 31C  
D, E, G, M, N
- 3274-51C, 3276-1, 2, 3, 4, 11, 12, 13, 14, 3602, 3631, 3632, 3651-25, 50, 75, 3684, 3694, 3771, 3774, 3775, 3776-1, 2, 3791, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5364, 5381, 5382, 5525, 6360, 6580, 6670, 8130, 8775  
C, D, G, K, M
- 3651-60  
C, K
- 3669  
C
- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3776-3, 4, 3777-1, 3, 4, 4331, 4361, 5360, 5362, 8101, 8140, 8150, 9373, 9375, 9377  
C, D, E, G, K, M

### 3705-II: <)

- (Except Japan > 3232-1, 8550, 8560, 8580  
C, D, G <)
- (Except Canada > 3274-1C

## MACHINES

- D, E, G, M, N, P
  - 3274-21C, 31C
    - D, E, G, M, N
  - 3274-51C, 3276-11, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 5340, 8130
    - C, D, G, K, L, M, N, P
  - 3274-52C
    - D, G, M, N
  - 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288
    - C, D, G, K, M, P
  - 3624, 4730, 4736
    - D, G, M
  - 3631, 3632, 3694, 3791, 5364, 5525, 6670
    - C, D, G, K, M
  - 3651-60
    - C, K, P
  - 3669
    - C
  - 3704
    - C, D, E, G, K, M
  - 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382
    - C, D, E, G, K, L, M, N, P, Q
  - 3708
    - D, E, G, K, M
  - 3710
    - C, D, E, G, K, M, N, P, Q
  - 3771, 3774, 3775, 3776-1, 2
    - C, D, G, K, M, N, P
  - 3776-3, 4, 3777-3, 4, 4331, 4361, 9373, 9375, 9377
    - C, D, E, G, K, M, N, P
  - 3777-1
    - C, D, E, G, K, M, P
  - 6360, 6580
    - C, D, G, K, L, M, N
  - 8101, 8140, 8150
    - C, D, E, G, K, L, M, N, P
  - 8775, 8815
    - C, D, G, K, M, N
- 3705-80: <)**
- (Except Japan > 3232-1
    - C, D, G <)
  - (Except Canada > 3274-1C
    - D, E, G, M, N, P
  - 3274-21C, 31C
    - D, E, G, M, N

- 3274-51C, 3276-11, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 5340, 8130
    - C, D, G, K, L, M, N, P
  - 3274-52C
    - D, G, M, N
  - 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288
    - C, D, G, K, M, P
  - 3624, 4730, 4736
    - D, G, M
  - 3631, 3632, 3694, 3791, 5364, 5525, 6670
    - C, D, G, K, M
  - 3651-60
    - C, K, P
  - 3669
    - C
  - 3704
    - C, D, E, G, K, M
  - 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382
    - C, D, E, G, K, L, M, N, P, Q
  - 3708
    - D, E, G, K, M
  - 3710
    - C, D, E, G, K, M, N, P, Q
  - 3771, 3774, 3775, 3776-1, 2
    - C, D, G, K, M, N, P
  - 3776-3, 4, 3777-3, 4, 4331, 4361, 9373, 9375, 9377
    - C, D, E, G, K, M, N, P
  - 3777-1
    - C, D, E, G, K, M, P
  - 6360, 6580
    - C, D, G, K, L, M, N
  - 8101, 8140, 8150
    - C, D, E, G, K, L, M, N, P
  - 8775, 8815
    - C, D, G, K, M, N
- 3708:**
- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4701-1, 2, 3, 4702, 8101, 8130, 8140, 8150
    - D, E, G, K, M
- 3710:**
- 3274-1C
    - D, E, G, M, N, P
  - 3274-21C, 31C
    - D, E, G, M, N
  - 3274-51C, 3276-11, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 5340, 8130

## MACHINES

- C, D, G, K, L, M, N, P
  - 3274-52C
    - D, G, M, N
  - 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288
    - C, D, G, K, M, P
  - 3624, 4730
    - D, G, M
  - 3631, 3632, 3694, 3791, 5364, 5525, 6670
    - C, D, G, K, M
  - 3651-60
    - C, K, P
  - 3669
    - C
  - 3705-II, 80, 3720, 3721, 3725-1, 2, 3726
    - C, D, E, G, K, M, N, P, Q
  - 3771, 3774, 3775, 3776-1, 2
    - C, D, G, K, M, N, P
  - 3776-3, 4, 3777-3, 4, 4331, 4361, 9373, 9375, 9377
    - C, D, E, G, K, M, N, P
  - 3777-1
    - C, D, E, G, K, M, P
  - 5360, 5362, 5381, 5382, 8101, 8140, 8150
    - C, D, E, G, K, L, M, N, P, Q
  - 6360, 6580
    - C, D, G, K, L, M, N
  - 8775, 8815
    - C, D, G, K, M, N
- 3720, 3721: <)**
- (Except Japan > 3232-1
    - C, D, G <)
  - (Except Canada > 3274-1C
    - D, E, G, M, N, P
  - 3274-21C, 31C
    - D, E, G, M, N
  - 3274-51C, 3276-II, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 5340, 8130
    - C, D, G, K, L, M, N, P
  - 3274-52C
    - D, G, M, N
  - 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288
    - C, D, G, K, M, P
  - 3624, 4730, 4736
    - D, G, M
  - 3631, 3632, 3694, 3791, 5364, 5525, 6670
    - D, G, M
  - 3631, 3632, 3694, 3791, 5364, 5525, 6670
    - C, D, G, K, M
  - 3651-60
    - C, D, G, K, M
- 3651-60
    - C, K, P
  - 3669
    - C
  - 3704
    - C, D, E, G, K, M
  - 3705-II, 80, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382
    - C, D, E, G, K, L, M, N, P, Q
  - 3708
    - D, E, G, K, M
  - 3710
    - C, D, E, G, K, M, N, P, Q
  - 3771, 3774, 3775, 3776-1, 2
    - C, D, G, K, M, N, P
  - 3776-3, 4, 3777-3, 4, 4331, 4361, 9373, 9375, 9377
    - C, D, E, G, K, M, N, P
  - 3777-1
    - C, D, E, G, K, M, P
  - 6360, 6580
    - C, D, G, K, L, M, N
  - 8101, 8140, 8150
    - C, D, E, G, K, L, M, N, P
  - 8775
    - C, D, G, K, M, N
- 3725-1, 2, 3726: <)**
- (Except Japan > 3232-1
    - C, D, G <)
  - (Except Canada > 3274-1C
    - D, E, G, M, N, P
  - 3274-21C, 31C
    - D, E, G, M, N
  - 3274-51C, 3276-11, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 5340, 8130
    - C, D, G, K, L, M, N, P
  - 3274-52C
    - D, G, M, N
  - 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288
    - C, D, G, K, M, P
  - 3624, 4730, 4736
    - D, G, M
  - 3631, 3632, 3694, 3791, 5364, 5525, 6670
    - C, D, G, K, M
  - 3651-60
    - C, D, G, K, M

## MACHINES

- C, K, P
- 3669
- C
- 3704
- C, D, E, G, K, M
- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382
- C, D, E, G, K, L, M, N, P, Q
- 3708
- D, E, G, K, M
- 3710
- C, D, E, G, K, M, N, P, Q
- 3771, 3774, 3775, 3776-1, 2
- C, D, G, K, M, N, P
- 3776-3, 4, 3777-3, 4, 4331, 4361, 9373, 9375, 9377
- C, D, E, G, K, M, N, P
- 3777-1
- C, D, E, G, K, M, P
- 6360, 6580
- C, D, G, K, L, M, N
- 8101, 8140, 8150
- C, D, E, G, K, L, M, N, P
- 8775
- C, D, G, K, M, N
- 3771, 3774, 3775, 3776-1, 2:**
- 3704
- C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
- C, D, G, K, M, N, P
- 3776-3, 4, 3777-3, 4:**
- 3704
- C, D, E, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
- C, D, E, G, K, M, N, P
- 3777-1:**
- 3704
- C, D, E, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
- C, D, E, G, K, M, P
- 9373, 9375, 9377
- C, D, G, K, M, N
- 3791:**
- 3276-1, 2, 3, 4, 11, 12, 13, 14
- D, G, M
- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
- C, D, G, K, M
- 3843:**
- 3631, 3632, 8101, 8130, 8140, 8150
- D, G
- 3845, 3846:**
- 3845, 3846
- C, D
- 4321:**
- 3602
- C, D, G, K, M, N, P
- 5360, 5362
- C, D, E, G, K, M, N, P
- 5381, 5382
- C, D, G, K, M, P
- 4331, 4361: <)**
- (Except Japan > 3232-1
- C, D, G <)
- (Except Canada > 3274-1C
- D, E, G, M, N, P
- 3274-21C, 31C
- D, E, G, M, N
- 3274-51C, 3276-11, 12, 13, 14, 3602, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 5340, 8130
- C, D, G, K, M, N, P
- 3274-52C
- D, G, M, N
- 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5381, 5382
- C, D, G, K, M, P
- 3631, 3632, 3694, 3791, 5150, 5160, 5364, 5525, 6670
- C, D, G, K, M
- 3624, 4730, 4736, 7426-2
- D, G, M
- 3651-60
- C, K, P
- 3669
- C
- 3704
- C, D, E, G, K, M

## MACHINES

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 3776-3, 4, 3777-3, 4, 4331, 4361, 5360, 5362, 8101, 8140, 8150, 9373, 9375, 9377

C, D, E, G, K, M, N, P

- 3777-1

C, D, E, G, K, M, P

- 6360, 6580, 8775, 8815

C, D, G, K, M, N

### 4701-1, 2, 3, 4702:

- 3603\*

D, G

- 3624\*, 4730, 4736\*\*

D, G, M

- 3704, 5364

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726

C, D, G, K, L, M, N, P

- 3708

D, E, G, K, M

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, N, P

- 5340, 5360, 5362

C, D, G, K, L, M, N

- 8101, 8130, 8140, 8150

D, G, M, N

- 9373, 9375, 9377

C, D, G, K, M, P

\* This communication is not SNA/SDLC, but via a Banking Loop

\*\* This communication is either SNA/SDLC or via a banking loop.

### 4730:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2, 3, 4702, 5340, 5360, 5362, 5381, 5382, 9373, 9375, 9377

D, G, M

### 4736:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2\*, 9373, 9375, 9377

D, G, M

\* This communication is either SNA/SDLC or via a banking loop.

### 4952, 4954, 4955, 4956, 4959, 4965:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 8101, 8130, 8140, 8150, 9373, 9375, 9377

C, D, G, K, M, P

### 5150, 5160:

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

### 5170:

- 9373, 9375, 9377

C, D, G, K, M

### 5251-2, 12:

- 5340, 5360\*, 5362\*, 5364\*, 5381, 5382

C, D, G, K, M, P

- 5364\*

C, D, G, K, M

\* 5360, 5362, and 5364 support 5251-12 only

### 5285, 5288:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, P

- 8101, 8130, 8140, 8150

D, G, M

### 5294-1:

- 5360, 5362, 5364, 5381, 5382

C, D, G, K, M, N, P, Q

### 5294-K01:

- 5360, 5362, 5381, 5382

C, D, G, K, M, N, P, Q

### 5340:

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 5340, 5360, 5362

C, D, G, K, L, M, N, P

- 3704, 5364

C, D, G, K, M

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, N, P

- 4701-1, 2, 3, 4702

C, D, G, K, L, M, N

- 4730

D, G, M

- 5251-2, 12

C, D, G, K, M, P

### 5360, 5362:

- 3704

C, D, E, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382

## MACHINES

- C, D, E, G, K, L, M, N, P, Q  
4321, 4331, 4361, 9373, 9375, 9377

C, D, E, G, K, M, N, P

- 4701-1, 2, 3, 4702

C, D, G, K, L, M, N

- 4730

D, G, M

- 5251-12

C, D, G, K, M, P

- 5294-1, K01

C, D, G, K, M, N, P, Q

- 5340

C, D, G, K, L, M, N, P

- 5364

C, D, G, K, M

### 5364:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2, 3, 4702, 5340, 5360, 5362, 5364, 9373, 9375, 9377

C, D, G, K, M

- 5251-12

C, D, G, K, M, P

- 5294-1

C, D, G, K, M, N, P, Q

### 5381, 5382:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382

C, D, E, G, K, L, M, N, P, Q

- 4321, 4331, 4361, 5251-2, 12, 9373, 9375, 9377

C, D, G, K, M, P

- 4730

D, G, M

- 5294-1, K01

C, D, G, K, M, N, P, Q

### 5525:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5525, 9373, 9375, 9377

C, D, G, K, M

### 6360, 6580:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 6360, 6580

C, D, G, K, L, M, N

- 4331, 4361

C, D, G, K, M, N

- 8101, 8130, 8140, 8150

D, G, M

### 6670:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 6670, 9373, 9375, 9377

C, D, G, K, M

- 8101, 8130, 8140, 8150

D, G, M

### 7426-2:

- 4331, 4361, 8101, 8130, 8140, 8150, 9373, 9375, 9377

D, G, M

### 8101, 8140, 8150: <)

- (Except Japan > 3232-1

D, G <)

- (Except Canada > 3843

D, G

- 3274-51C, 52C, 3276-11, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 8775

D, G, M, N

- 3276-1, 2, 3, 4, 3631, 3632, 3651-25, 75, 3684, 5285, 5288, 6360, 6580, 6670, 7426-2

D, G, M

- 3704

C, D, E, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726

C, D, E, G, K, L, M, N, P

- 3708

D, E, G, K, M

- 4331, 4361, 9373, 9375, 9377

C, D, E, G, K, M, N, P

- 4952, 4954, 4955, 4956, 4959, 4965

C, D, G, K, M, P

- 8101, 8140, 8150

D, E, G, M, N, P

- 8130

D, G, M, N, P

### 8130: <)

- (Except Japan > 3232-1

D, G <)

- (Except Canada > 3843

D, G

- 3274-51C, 52C, 3276-11, 12, 13, 14, 3602, 4701-1, 2, 3, 4702, 8775

D, G, M, N

- 3276-1, 2, 3, 4, 3631, 3632, 3651-25, 75, 3684, 5285, 5288, 6360, 6580, 6670, 7426-2

## MACHINES

- D, G, M
- 3704
  - C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726
  - C, D, G, K, L, M, N, P
- 3708
  - D, E, G, K, M
- 4331, 4361, 9373, 9375, 9377
  - C, D, G, K, M, N, P
- 4952, 4954, 4955, 4956, 4959, 4965
  - C, D, G, K, M, P
- 8101, 8130, 8140, 8150
  - D, G, M, N, P
- 8550, 8560, 8580**
- 3705-II
  - C, D, G
- 8775:**
- 3704
  - C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361
  - C, D, G, K, M, N
- 8101, 8130, 8140, 8150
  - D, G, M, N
- 8815:**
- 3705-II, 80, 3710, 4331, 4361, 8815
  - C, D, G, K, M, N
- 9373, 9375, 9377:**
- 3174-1R, 3274-1C
  - D, E, G, M, N, P
- 3274-21C, 31C
  - D, E, G, M, N
- 3174-51R, 3274-51C, 3276-11, 12, 13, 14, 3602, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 5340, 8130
  - C, D, G, K, M, N, P
- 3274-52C
  - D, G, M, N
- 3276-1, 2, 3, 4, 3651-25, 50, 75, 3684, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5381, 5382
  - C, D, G, K, M, P
- 3624, 4730, 4736, 7426-2
  - D, G, M
- 3631, 3632, 3694, 3791, 5150, 5160, 5170, 5364, 5525, 6670
  - C, D, G, K, M
- 3651-60

- C, K, P
- 3669
  - C
- 3704
  - C, D, E, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 3776-3, 4, 4331, 4361, 5360, 5362, 8101, 8140, 8150
  - C, D, E, G, K, M, N, P
- 3777-1
  - C, D, E, G, K, M, P(<)
- (Canada only > 3174-1R:**
- 9373, 9375, 9377
  - D, G, M, P
- 3174-51R:**
- 9373, 9375, 9377
  - C, D, G, K, M, N, P
- 3232-1:**
- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
  - C, D, G
- 8101, 8130, 8140, 8150
  - D, G
- 3274-1C, 21C, 31C:**
- 3704
  - D, G, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
  - D, G, M, P
- 3274-51C:**
- 3704
  - C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726
  - C, D, G, K, L, M, N, P
- 4331, 4361, 9373, 9375, 9377
  - C, D, G, K, M, N, P
- 8101, 8130, 8140, 8150
  - D, G, M, N
- 3276:**
- 3704
  - C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377
  - C, D, G, K, M, P
- 3791, 8101, 8130, 8140, 8150
  - D, G, M

**MACHINES****3602:**

- 3603\*  
D, G
- 3624\*, 8101, 8130, 8140, 8150  
D, G, M
- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P

\* This communication is not SNA/SDLC, but via a "B-Loop"

**3603:**

- 3602\*, 4701-1, 2\*, 3, 4702  
D, G
- \* This communication is not SNA/SDLC, but via a Banking Loop

**3624:**

- 3602\*, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2\*, 3, 4702, 9373, 9375, 9377  
D, G, M
- \* This communication is not SNA/SDLC, but via a "B-Loop"

**3631, 3632:**

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M
- 3843  
D, G
- 8101, 8130, 8140, 8150  
D, G, M

**3651-25:**

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
- 8101, 8130, 8140, 8150  
D, G, M

**3651-50:**

- 3659\*  
D, G
- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P

\* This communication is not SNA/SDLC, but via an "S-Loop"

**3651-60:**

- 3669\*  
C
- 3704  
C, K
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361  
C, K, P

\* This communication is not SNA/SDLC, but via an "S-Loop"

**3651-75:**

- 3651-75, 3704  
C, D, G, K, M
- 3659\*  
D, G
- 3669\*, 3689\*  
C
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
- 8101, 8130, 8140, 8150  
D, G, M

\* This communication is not SNA/SDLC, but via an "S-Loop"

**3659:**

- 3651-50\*, 75\*  
D, G
- \* This communication is not SNA/SDLC, but via an "S-Loop"

**3669:**

- 3651-60\*, 75\*, 3669\*, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361  
C
- \* This communication is not SNA/SDLC, but via an "S-Loop"

**3684:**

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, P
- 8101, 8130, 8140, 8150  
D, G, M

**3689:**

- 3651-75\*, 3689\*, 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361  
C
- \* This communication is not SNA/SDLC, but via an "R-Loop"

## MACHINES

### 3694:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M

### 3704:

- 3232-1  
C, D, G
- 3274-1C, 21C, 31C, 3624, 4730, 4736  
D, G, M
- 3274-51C, 3276, 3602, 3631, 3632, 3651-25, 50, 75, 3684, 3694, 3771, 3774, 3775, 3776-1, 2, 3791, 4331, 4361, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 5525, 6360, 6580, 6670, 8130, 8775, 9373, 9375, 9377  
C, D, G, K, M
- 3651-60  
C, K
- 3669, 3689  
C
- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 3776-3, 4, 3777-1, 3, 4, 8101, 8140, 8150  
C, D, E, G, K, M

### 3705-II:

- 3232-1, 8550, 8560, 8580  
C, D, G
- 3274-1C, 21C, 31C  
D, G, M, P
- 3274-51C, 8130  
C, D, G, K, L, M, N, P
- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4331, 4361, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340  
C, D, G, K, M, P
- 3624, 4730, 4736  
D, G, M
- 3631, 3632, 3694, 3791, 5364, 5525, 6360, 6580, 6670  
C, D, G, K, M
- 3651-60  
C, K, P
- 3669, 3689  
C\*
- 3704  
C, D, E, G, K, M
- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382  
C, D, E, G, K, L, M, N, P, Q
- 3708  
D, E, G, K, M

- 3710  
C, D, E, G, K, M, N, P, Q
- 3776-3, 4, 3777-1, 3, 4  
C, D, E, G, K, M, P
- 4331, 4361  
C, D, G, K, M, N, P
- 8101, 8140, 8150  
C, D, E, G, K, L, M, N, P
- 8775, 8815  
C, D, G, K, M, N

### 3705-80:

- 3232-1  
C, D, G
- 3274-1C, 21C, 31C  
D, G, M, P
- 3274-51C, 8130  
C, D, G, K, L, M, N, P
- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340  
C, D, G, K, M, P
- 3624, 4730, 4736  
D, G, M
- 3631, 3632, 3694, 3791, 5364, 5525, 6360, 6580, 6670  
C, D, G, K, M
- 3651-60  
C, K, P
- 3669, 3689  
C
- 3704  
C, D, E, G, K, M
- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382  
C, D, E, G, K, L, M, N, P, Q
- 3708  
D, E, G, K, M
- 3710  
C, D, E, G, K, M, N, P, Q
- 3776-3, 4, 3777-1, 3, 4,  
C, D, E, G, K, M, P
- 4331, 4361  
C, D, G, K, M, N, P
- 8101, 8140, 8150  
C, D, E, G, K, L, M, N, P
- 8775, 8815  
C, D, G, K, M, N

## MACHINES

### 3706-II, 80:

- 9373, 9375, 9377  
C, D, G, K, M, N, P

### 3708:

- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 8101, 8130, 8140, 8150  
D, E, G, K, M

### 3710:

- 3274-1C, 21C, 31C  
D, G, M, P
- 3274-51C, 8130  
C, D, G, K, L, M, N, P
- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 9373, 9375, 9377  
C, D, G, K, M, P
- 3624, 4730  
D, G, M
- 3631, 3632, 3694, 3791, 5525, 6360, 6580, 6670  
C, D, G, K, M
- 3651-60  
C, K, P
- 3669, 3689  
C
- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726  
C, D, E, G, K, M, N, P, Q
- 3776-3, 4, 3777-1, 3, 4  
C, D, E, G, K, M, P
- 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N, P
- 5360, 5362, 5381, 5382  
C, D, E, G, K, L, M, N, P, Q
- 8101, 8140, 8150  
C, D, E, G, K, L, M, N, P
- 8775, 8815  
C, D, G, K, M, N

### 3651-60:

- 9373, 9375, 9377  
C, K, P

### 3669, 3689:

- 9373, 9375, 9377  
C

### 3720, 3721:

- 3232-1  
C, D, G

- 3274-1C, 21C, 31C

D, G, M, P

- 3274-51C, 8130

C, D, G, K, L, M, N, P

- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340

C, D, G, K, M, P

- 3624, 4730, 4736

D, G, M

- 3631, 3632, 3694, 3791, 5364, 5525, 6360, 6580, 6670

C, D, G, K, M

- 3651-60

C, K, P

- 3669, 3689

C

- 3704

C, D, E, G, K, M

- 3705-II, 80, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382

C, D, E, G, K, L, M, N, Q

- 3708

D, E, G, K, M

- 3710

C, D, E, G, K, M, N, P, Q

- 3776-3, 4, 3777-1, 3, 4

C, D, E, G, K, M, P

- 4331, 4361

C, D, G, K, M, N, P

- 8101, 8140, 8150

C, D, E, G, K, L, M, N, P

- 8775

C, D, G, K, M, N

### 3725-1, 2, 3726:

- 3232-1

C, D, G

- 3274-1C, 21C, 31C

D, G, M, P

- 3274-51C, 8130

C, D, G, K, L, M, N, P

- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340

C, D, G, K, M, P

- 3624, 4730, 4736

D, G, M

## MACHINES

- 3631, 3632, 3694, 3791, 5364, 5525, 6360, 6580, 6670

C, D, G, K, M

- 3651-60

C, K, P

- 3669, 3689

C

- 3704

C, D, E, G, K, M

- 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382

C, D, E, G, K, L, M, N, P, Q

- 3708

D, E, G, K, M

- 3710

C, D, E, G, K, M, N, P, Q

- 3776-3, 4, 3777-1, 3, 4,

C, D, E, G, K, M, P

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, N, P

- 8101, 8140, 8150

C, D, E, G, K, L, M, N, P

- 8775

C, D, G, K, M, N

### 3771, 3774, 3775, 3776-1, 2:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, P

### 3776-3, 4, 3777-1, 3, 4:

- 3704

C, D, E, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726

C, D, E, G, K, M, P

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

### 3791:

- 3276

D, G, M

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

### 3843:

- 3631, 3632, 8101, 8130, 8140, 8150

D, G

### 3845, 3846:

- 3845, 3846

C, D

### 4321, 5381, 5382:

- 5360, 5362

C, D, G, K, M, P

### 4331, 4361:

- 3232-1

C, D, G

- 3274-1C, 21C, 31C

D, G, M, P

- 3274-51C, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 8101, 8130, 8140, 8150, 9373, 9375, 9377

C, D, G, K, M, N, P

- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5360, 5362, 5381, 5382

C, D, G, K, M, P

- 3624, 4730, 4736, 7426

D, G, M

- 3631, 3632, 3694, 3704, 3776-3, 4, 3777-1, 3, 4, 3791, 5150, 5160, 5364, 5525, 6360, 6580, 6670

C, D, G, K, M

- 3651-60

C, K, P

- 3669, 3689

C

- 8775, 8815

C, D, G, K, M, N

### 4701-1, 2, 3, 4702:

- 3603\*

D, G

- 3624\*, 4730, 4736, 8101, 8130, 8140, 8150

D, G, M

- 3704, 5340, 5360, 5362, 5364

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, P

- 3708

D, E, G, K, M

\* This communication is not SNA/SDLC, but via a Banking Loop

### 4730:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2, 4702, 5340, 5360, 5362, 5381, 5382, 9373, 9375, 9377

D, G, M

## MACHINES

### 4736:

- 3704, 3705-II, 80, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2\*, 9373, 9375, 9377

D, G, M

\* This communication is not SNA/SDLC, but via a Banking Loop

### 4952, 4954, 4955, 4956, 4959, 4965:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 8101, 8130, 8140, 8150, 9373, 9375, 9377

C, D, G, K, M, P

- 3708

D, E, G, K, M

### 5150, 5160:

- 4331, 4361, 9373, 9375, 9377

C, D, G, K, M

- 8101, 8130, 8140, 8150

D, M

### 5170:

- 9373, 9375, 9377

C, D, G, K, M

### 5251-2, 12:

- 5340, 5360\*, 5362\*, 5381, 5382

C, D, G, K, M, P

- 5364\*

C, D, G, K, M

\* 5360, 5362, and 5364 support 5251-12 only

### 5285, 5288:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377

C, D, G, K, M, P

- 8101, 8130, 8140, 8150

D, G, M

### 5294-1:

- 5360, 5362, 5381, 5382

C, D, G, K, M, N, P, Q

- 5364

C, D, G, K, M

### 5340:

- 3704, 4701-1, 2, 3, 4702, 5364

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5251-2, 12, 5340, 5360, 5362, 9373, 9375, 9377

C, D, G, K, M, P

- 4730

D, G, M

### 5360, 5362:

- 3704, 4701-1, 2, 3, 4702, 5364

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382

C, D, E, G, K, L, M, N, P, Q

- 4321, 4331, 4361, 5340, 5251-12, 9373, 9375, 9377

C, D, G, K, M, P

- 4730

D, G, M

- 5294-1

C, D, G, K, M, N, P, Q

### 5364:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 4701-1, 2, 3, 4702, 5251-12, 5294-1, 5360, 5362, 5364, 9373, 9375, 9377

C, D, G, K, M

- 5340

C, D, G, K, M, P

### 5381, 5382:

- 3704

C, D, G, K, M

- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 5360, 5362, 5381, 5382

C, D, E, G, K, L, M, N, P, Q

- 4321, 4331, 4361, 5251-2, 12, 9373, 9375, 9377

C, D, G, K, M, P

- 4730

D, G, M

- 5294-1

C, D, G, K, M, N, P, Q

### 5525:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 5525, 9373, 9375, 9377

C, D, G, K, M

### 6360, 6580:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 6360, 6580, 9373, 9375, 9377

C, D, G, K, M

- 8101, 8130, 8140, 8150

D, G, M

## MACHINES

### 6670:

- 3704, 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 6670, 9373, 9375, 9377  
C, D, G, K, M
- 8101, 8130, 8140, 8150  
D, G, M

### 7426:

- 4331, 4361, 8101, 8130, 8140, 8150, 9373, 9375, 9377  
D, G, M

### 8101, 8140, 8150:

- 3232-1, 3843  
D, G
- 3274-51C, 8775  
D, G, M, N
- 3276, 3602, 3631, 3632, 3651-25, 75, 3684, 4701-1, 2, 3, 4702, 5285, 5288, 6360, 6580, 6670, 7426  
D, G, M
- 3704  
C, D, E, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726  
C, D, E, G, K, L, M, N, P
- 3708  
D, E, G, K, M
- 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N, P
- 4952, 4954, 4955, 4956, 4959, 4965  
C, D, G, K, M, P
- 5150, 5160  
D, M
- 8101, 8140, 8150  
D, E, G, M, N, P
- 8130  
D, G, M, N, P

### 8130:

- 3232-1, 3843  
D, G
- 3274-51C, 8775  
D, G, M, N
- 3276, 3602, 3631, 3632, 3651-25, 75, 3684, 4701-1, 2, 3, 4702, 5285, 5288, 6360, 6580, 6670, 7426  
D, G, M
- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726  
C, D, G, K, L, M, N, P

- 3708  
D, E, G, K, M
- 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N, P
- 4952, 4954, 4955, 4956, 4959, 4965  
C, D, G, K, M, P
- 5150  
D, M
- 8101, 8130, 8140, 8150  
D, G, M, N, P

### 8550, 8560, 8580

- 3705-II  
C, D, G

### 8775:

- 3704  
C, D, G, K, M
- 3705-II, 80, 3710, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 9373, 9375, 9377  
C, D, G, K, M, N
- 8101, 8130, 8140, 8150  
D, G, M, N

### 8815:

- 3705-II, 80, 3710, 4331, 4361, 8815, 9373, 9375, 9377  
C, D, G, K, M, N

### 9373, 9375, 9377:

- 3232-1  
C, D, G
- 3174-1R, 3274-1C, 21C, 31C  
D, G, M, P
- 3174-51R, 3274-51C, 3706-II, 80, 3710, 3720, 3721, 3720, 3721, 3725-1, 2, 3726, 4331, 4361, 8101, 8130, 8140, 8150  
C, D, G, K, M, N, P
- 3276, 3602, 3651-25, 50, 75, 3684, 3771, 3774, 3775, 3776-1, 2, 4701-1, 2, 3, 4702, 4952, 4954, 4955, 4956, 4959, 4965, 5285, 5288, 5340, 5360, 5362, 5381, 5382  
C, D, G, K, M, P
- 3624, 4730, 4736, 7426  
D, G, M
- 3631, 3632, 3694, 3704, 3776-3, 4, 3777-1, 3, 4, 3791, 5150, 5160, 5170, 5364, 5525, 6360, 6580, 6670  
C, D, G, K, M
- 3651-60  
C, K, P
- 3669, 3689  
C
- 8775, 8815

**IBM** IBM Canada Ltd.

**MACHINES**

**M 2700.30**  
**AUG 87**

C, D, G, K, M, N<)

2700 General

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## 2700 CHART C - THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

### CHART C - THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

For each machine type, the special features required for attachment are shown.

#### FACILITY CA1

Start/stop operation at 300 bps on the PSTN via an integrated modem.(1, 2)

--(Canada only > 3704, 3705-II: #4782 and #9612 or, for Interrupt, #4786 and #9612 <)

--4987: #4746 or #4747

#### (EXCEPT CANADA > FACILITY C1

Start/stop operation at 134.5, 200 or 300 bps on the PSTN via a 3976 model 2 Modem or a PTT-mandatory modem complying with CCITT Recommendations V.24, V.25 and V.28 and ISO Standard 2110 < ) (1, 2)

--(Except Canada > 2701: #4640, #9581 and #2910 (at 134.5 bps only) <)

--(Except Canada > 3101: (5)

--3138: #4640 and #9721 (3) <)

--(Except Canada > 3161, 3163: (5) <)

--(Except Canada > 3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps), #2717 (at 200 bps) or #9612 (at 300 bps) (18)

--3705-80: No special feature required at 134.5 bps, #1412 (at 200 bps) or #1413 (at 300 bps)

--3708: No special feature required. <)

--(Except Canada > 3725-1, 2, 3726: #4911 and #4666 (25)

--3792: #3701 (at 134.5 bps only)

--3845, 3846: (5, 15) <)

--(Except Canada > 4331, 4361: #1601, #3701, #4696 and #968X (4) (at 134.5 or 300 bps only)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--5110: #1525 (at 134.5 or 300 bps only)

--6360: #3704 or #3705 or #3707

--6580: #3705

--9373, 9375, 9377: #6030, #6031 (134.5, 300, bps only) <)

#### (CANADA ONLY > FACILITY C1M

Start/stop operation at 134.5 or 300 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy.(2)

--2701: #4640 and #9581 (at 134.5 bps only)

--3101: (5)

--3138: #4640 and #9721 (3)

--3161, 3163: (5) <)

--(Canada only > 3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)

--3705-80: No special feature required (at 134.5 bps), #1413 (at 300 bps)

--3708: No special feature required.

--3725-1, 2, 3726: #4911 and #4666 (25)

--3792: #3701 (at 134.5 bps only)

--3845, 3846: (5, 15) <)

--(Canada only > 4331, 4361: #1601, #3701, #4696 and #968X (4)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--5110: #1525 (at 134.5 bps only)

--6360: #3704 or #3705 or #3707

--6580: #3705

--6733: at 300 bps only (5)

--7426

--9373, 9375, 9377: #6030, #6031 <)

#### FACILITY CA2

Synchronous operation at 600/1200 bps on the PSTN via an integrated modem (1, 2, 8(Except Canada >, 18 <))

--(Canada only > 2701: #4782 (7)

--3274-51C: #6301, #9112 and #5501 or #5502 <)

--(Except Canada > 3274-51C: #5501, #6301 and #9112 <)

--3276-11, 14: #5501 and #6301

--(Canada only > 3651-25: #9512

--3684: #5530 and #9481

--3704, 3705-II: #4782 or, with Interrupt, #4786 (9) and #9607 (at 600 bps) or #9608 (at 1200 bps)

--3741: #5501

--3771, 3774, 3775: #1482 and #5501 or #5502

--3791: #5501 and #6301 (6) <)

--(Canada only > 4331, 4361: #1601, #4696, #4781 and #967X or #969X (4)

--4987: #4751 or #4752 <)

--(Except Canada > 3684: #2830 and #5530

--3741: #5501

## MACHINES

--3771, 3774, 3775: #1482 and #5501  
 --3791: #2947, #5502 and #6301 (6) <  
 --(Except Canada > 4331: #1601, #2831, #4696 and #967X or #969X (4)  
 --4987: #4751 or #4752 <  
 --5110-1, 2: #5501  
 --5231: #5501  
 --5251-2, 12: #5502  
 --5265: #5501  
 --5285, 5288: #5501  
 --5340: #5501 (10)  
 --5360: #5501  
 --(Canada only > 5381: #5501 or #5502 <  
 --(Except Canada > 5381: #5501 <  
 --(Canada only > 5525: #1750 and #5501 or #1751 and #5503 <  
 --6670: #5501  
 --8101, 8130 A, 8140 A, B: #5501 and #1601

### (EXCEPT CANADA > FACILITY C2

Synchronous operation at 600/1200 bps on the PSTN via a 3976 model 3 Modem or a PTT-mandatory modem complying with CCITT Recommendations V.23, V.24, V.25 and V.28 and ISO Standard 2110 <) (Except Canada > (1, 2, 8, 14) <)

--(Except Canada > 2701: #2899 and #2973 (7, 11) or #2899 (7, 12) <  
 (#2970 is required in place of #2899)  
 --(Except Canada > 3138: #4640 and #9649 (3, 11) or #4640, #9609 and #9649 (3, 12)  
 --3274-51C: #3701, #6301, and #9112  
 --3276-11, 14: #3701 and #6301 (11) or #3701 and #6302 (12)  
 --3602: #3701 and #4501 or #6301 (11) or #3701 and #4502 or #6302 (12)  
 --3631, 3632: #3701 and #6301 (11) or #3701 and #4502 or #6302 (12)  
 --3651-25, 50: #2821, #2858 and #2835 or #2836 or #2982 (11)  
 --3651-60: #2901 (11)  
 --3651-75: #2821, #2858 and #2835 or #2836 or #2982 and/or #2703 and #2721 or #2722 or #2723 (11)  
 --3684: #3701 and #9695 (11) or #3701 and #9820 (12) <  
 --3694: #3701 and #4501 (11) or #3701 and #4502 (12)  
 --(Except Canada > 3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (9, 11) or #4714 (9, 12)  
 --3705-80: #1415 (11) or no special feature required (12)  
 --3710: #7001 <  
 --(Except Canada > 3708: No special feature required.

--3725-1, 2, 3728: #4911 and #4666 (11, 24, 25) or #4911 (12, 24)  
 --3741: #7705 and #2847, #2896 or #2982 (11) or #2848 (12)  
 --3771, 3774, 3775: #1482 and #3701 (11) or #1481 and #3701 (12)  
 --3791: #3701 and #6301 (6, 11) or #3701 and #6302 or #6303 (6, 12)  
 --3845, 3846: (5, 15) <  
 --(Except Canada > 4331, 4361: #1601, #3701, #4696 and #967X or #969X (4, 11) or #1601, #3701, #4695 and #967X or #969X (4, 12)  
 --4701-1, 2, 3: (22) <  
 --(Except Canada > 4702: (22)  
 --4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310 (1200 bps only)  
 --4987: #4730  
 --5110: #2074 and #3701  
 --5231: #2074, #4780, #9334, #9483 and #9751 (11) or #2074, #4780, #9483 and #9751 (12)  
 --5251-2, 12: #3701 and #4703 (11) or #3701 (12)  
 --5265: #3701  
 --5285, 5288: #3701  
 --5340: #3701 and #4703 (10, 11) or #3701 (10, 12)  
 --5360: #3701 and #5321 (11) or #3701 (12)  
 --5362: #2920 (11, 12)  
 --5364: (26)  
 --5381: #3701 and #9201  
 --5525: #1750 and #3701 or #1751 and #3702 (11) or #3701 or #3702 (12)  
 --6360: #3704 or #3705 or #3707 (11)  
 --6580: #3705 (11)  
 --6670: #3701 (11)  
 --8101, 8130 A: #1601 and #3701 (11) or #1602 and #3701 (12)  
 --8130 B: #1602 and #3701 (12)  
 --8140 A, B: #1601 and #3701 (11) or #1602 and #3701 (12)  
 --8140 C: #1610, #1611, #1620, #1621, #1622 or #1630 (12)  
 --8150: #1732, #1733, #1734, #1735, #1763 or #1764 (12)  
 --8775: #1488, #3701 and #9493 (11) or #3701 and #9493 (12)  
 | --9373, 9375, 9377: #6030, #6031 <

### (CANADA ONLY > FACILITY C2M

Start/stop or synchronous operation at 600/1200 bps via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2, 8)

### --S/S Machine Types

--3101: (5)

## MACHINES

--3161, 3163: (5)

--3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps or #9615 (at 600/1200 bps)

--3725-1, 2, 3726: #4911 and #4666 (11, 24, 25) or #4911 (12, 24)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2096 or #1310 (1200 bps only)

--4987: #4730

--6733: (at 1200 bps only--Start/Stop) (5)

--Sync Machine Types

--2701: #7692 and #7698 (11)

--3138: #4640 and #9649 (3, 11) or #4640, #9609 and #9649 (3, 12)

--3232-1: (5) <

--(Canada only > 3274-51C: #3701, #6301, and #9112

--3276-11, 14: #3701 and #6301 (11) or #3701 and #6302 (12)

--3602: #3701 and #4501 or #6301 (11) or #3701 and #4502 or #6302 (12)

--3631, 3632: #3701 and #6301 (11) or #3701 and #4502 or #6302 (12)

--3651-25: #9150

--3651-50: 9121 (11)

--3651-60: (5, 11)

--3651-75: #9121 or #6185 (11)

--3684: #3701 and #9695 (11) or #3701 and #9820 (12)

--3694: #3701 and #4501 (11) or #3701 and #4502 (12)

--3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (9, 11) or #4714 (9, 12)

--3705-80: #1415 (11) or no special feature required (12)

--3708: No special feature required.

--3710: #7001

--3725-1, 2, 3726: #4911 and #4666 (11, 24, 25) or #4911 (12, 24)

--3741: #9123 (11)

--3771, 3774, 3775: #1482 and #3701 (11) or #1481 and #3701 (12)

--3791: #3701 and #6301 (6, 11) or #3701 and #6302 or #6303 (6, 12)

--3845, 3846: (5) <

--(Canada only > 4331, 4361: #1601, #3701, #4696 and #967X or #969X (4, 11) or #1601, #3701, #4695 and #967X or #969X (4, 12)

--4701-1, 2: (22)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310 (1200 bps only)

--4987: #4730

--5110: #2074 and #3701

--5231: #2074, #4780, #9334, #9483 and #9751 (11) or #2074, #4780, #9483 and #9751 (12)

--5251-2, 12: #3701 and #4703 (11) or #3701 (12)

--5265: #3701

--5285, 5288: #3701

--5340: #3701 and #4703 (10, 11) or #3701 (10, 12)

--5360: #3701 and #5321 (11) or #3701 (12)

--5362: #2920 (11, 12)

--5364: (26)

--5381: #3701

--5525: #1750 and #3701 or #1751 and #3702 (11) or #3701 or #3702 (12)

--6360: #3704 or #3705 or #3707 (11)

--6580: #3701 (11)

--6670: #3701 (11)

--7426: (5)

--8101, 8130 A: #1601 and #3701 (11) or #1602 and #3701 (12)

--8130 B: #1602 and #3701 (12)

--8140 A, B: #1601 and #3701 (11) or #1602 and #3701 (12)

--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630 (12)

--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (12)

--8775: #1488, #3701 and #9493 (11) or #3701 and #9493 (12)

--9373, 9375, 9377: #6030, #6031 <

## FACILITY CA3

Synchronous operation at 2400 bps on the PSTN via an integrated modem (1, 2, 13)

--(Canada only > 3669: (5, 13)

--3704, 3705-II: #4761 (9)

--3774, 3775, 3776-1, 2: #5610 <

--5251-2, 12: #5641

--(Canada only > 5340: #5610 (10) <

--5381: #5641

## FACILITY C3

Synchronous operation at 2400 bps on the PSTN via a 3863 model 2 Modem or (Canada only > a 3872 Modem <) (Except Canada > a PTT-mandatory modem complying with CCITT Recommendations V.24, V.25, V.26bis and V.28 and ISO Standard 2110 <) (1, 2, 14)

--(Canada only > 2701: #7698 (7) <

--(Except Canada > 2701: #2899 (7) <) (Japan only > (#2970 is required in place of #2899) <

--3138: #4640, #9609 and #9649 (3)

--(Except Japan > 3232-1: (5) <

**MACHINES**

--3274-51C: #3701, #9112 and #6302 or #6303  
--3276-11, 14: #3701, #6302 and #9490  
--3602: #3701 and #4502 or #6302  
--3631, 3632: #3701 and #4502 or #6302  
--(Canada only > 3651-25, 50: #9120  
--3651-75: #9120 and/or #6185 <)  
--(Except Canada > 3651-25, 50: #2822 and #2891 or #2897  
--3651-75: #2822 and #2891 or #2897 and/or #6185 and #2725 or #2727 <)  
--3684: #3701 and #9822  
--(Canada and Japan only > 3694: #3701 and #4502 <)  
--3704, 3705-II: #4714 (9)  
--3705-80: No special feature required  
--3708: No special feature required.  
--3710: #7001  
--3725-1, 2, 3726: #4911 (24)  
--3741: #9121  
--3771, 3774, 3775: #1481 and #3701  
--3776-1, 2, 3777-1, 2: #1481 and #3701  
--3776-3, 4, 3777-3, 4: #3701  
--3791: #3701 and #6302 or #6303 (6)  
--3845, 3846: (5, 15)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2, 3: (22)  
--4702: (22)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310  
--4987: #4730  
--5110: #2074 and #3701  
--5231: #4780, #9483 and #9753  
--5251-2, 12: #3701  
--5294-1: #3701  
--(Except Canada > 5294-K01: #3701 <)  
--5265: #3701  
--5285, 5288: #3701  
--5340: #3701 (10)  
--5360: #3701 or #4552  
--5362: #2920  
--5364: (26)  
--5381: #3701

--5525: #3701 or #3702  
--6360: #3704 or #3705 or #3707  
--6580: #3705  
--6670: #3701  
--8101, 8130, 8140 A, B: #1602 and #3701  
--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (12)  
--8775: #3701 and #9493  
--8815-1: #3701  
--9373, 9375, 9377: #6030, #6031

**(CANADA AND JAPAN ONLY > FACILITY C3M**

Synchronous operation at 2400 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

--2701: #7698 (7)  
--3138: #4640, #9609 and #9649 (3)  
--3232-1: (5)  
--3274-51C: #3701, #9112 and #6302 or #6303  
--3276-11, 14: #3701, #6302 and #9490  
--3602: #3701 and #4502 or #6302  
--3631, 3632: #3701 and #4502 or #6302  
--3651-25, 50: #9120  
--3651-75: #9120 and/or #6185  
--3684: #3701 and #9822  
--3694: #3701 and #4502  
--3704, 3705-II: #4714 (9)  
--3705-80: No special feature required  
--3708: No special feature required.  
--3710: #7001  
--3725-1, 2, 3726: #4911 (24)  
--3741: #9121  
--3771, 3774, 3775: #1481 and #3701\*  
--3776-1, 2, 3777-1, 2: #1481 and #3701  
--3776-3, 4, 3777-3, 4: #3701  
--3791: #3701 and #6302 or #6303 (6)  
--3845, 3846: (5, 15) <)  
--(Canada and Japan only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2: (22)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310

## MACHINES

--4987: #4730  
--5110: #2074 and #3701  
--5231: #4780, #9483 and #9753  
--5251-2, 12: #3701  
--5294-1: #3701<  
--(Japan only > 5294-K01: #3701<)  
--(Canada and Japan only > 5265: #3701  
--5285, 5288: #3701  
--5340: #3701 (10)  
--5360: #3701 or #4552  
--5362: #2920  
--5364: (26)  
--5381: #3701  
--5525: #3701 or #3702  
--6360: #3704 or #3705 or #3707  
--6580: #3705  
--6670: #3701  
--8101, 8130, 8140 A, B: #1602 and #3701  
--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (12)  
--8775: #3701 and #9493  
--8815-1: #3701  
--9373, 9375, 9377: #6030, #6031<

## FACILITY CA4

Synchronous operation at 4800 bps on the PSTN via an integrated modem (1, 2, 16)

--(Canada only > 3689: (5, 16)<  
--5251-2, 12: #5741  
--5340: #5361 (10)  
--5381: #5741

## FACILITY C4

Synchronous operation at 4800 bps on the PSTN via a 3864 model 2 Modem or (Canada only > a 3874 Modem<) (Except Canada > a PTT-mandatory modem complying with CCITT Recommendations V.24, V.25, V.27ter and V.28 and ISO Standard 2110<) (1, 2)

--(Canada only > 2701: #7698 (7)<  
--(Except Canada > 2701: #2899 (7)<) (Japan only > #2790 is required in place of #2899)<  
--3138: #4640, #9609 and #9649 (3)  
--(Except Japan > 3232-1: (5)<

--3274-51C: #3701, #9112 and #6302 or #6303  
--3276-11, 14: #3701 and #6302  
--3602: #3701 and #4502 or #6302  
--3631, 3632: #3701 and #4502 or #6302  
--3651-50: #9126  
--3684: #3701 and #9823  
--(Canada only > 3694: #3701 and #4502<)  
--(Japan only > 3694: #3701 and #4502<)  
--3704, 3705-II: #4714 (9)  
--3705-80: No special feature required  
--3708: No special feature required  
--3710: #7001  
--3725-1, 2, 3726: #4911 (24)  
--3771, 3774, 3775: #1481 and #3701  
--3776-1, 2, 3777-1, 2: #1481 and #3701  
--3776-3, 4, 3777-3, 4: #3701  
--3791: #3701 and #6302 or #6303 (6)  
--3845, 3846: (5, 15)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2, 3: (22)  
--4702: (22)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310  
--4987: #4730  
--5110: #3701  
--5231: #4780, #9483 and #9754  
--5251-2, 12: #3701  
--5294-1: #3701  
--(Except Canada > 5294-K01: #3701<)  
--5285, 5288: #3701, #9483 and #9754  
--5340: #3701 (10)  
--5360: #3701 or #4552  
--5362: #2920  
--5364: (26)  
--5381: #3701  
--5525: #3701 or #3702  
--8101, 8130, 8140 A, B: #1602 and #3701  
--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (12)

## MACHINES

--8775: #3701 and #9493  
--8815-1: #3701  
--9373, 9375, 9377: #6030, #6031

### (CANADA AND JAPAN ONLY > FACILITY C4M

Synchronous operation at 4800 bps on the PSTN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

--2701: #7698 (7)  
--3138: #4640, #9609 and #9649 (3)  
--3232-1: (5)  
--3274-51C: #3701, #9112 and #6302 or #6303  
--3276-11, 14: #3701 and #6302  
--3602: #3701 and #4502 or #6302  
--3631, 3632: #3701 and #4502 or #6302  
--3651-25, 50, 75: #9126  
--3684: #3701 and #9823  
--3694: #3701 and #4502  
--3704, 3705-II: #4714 (9)  
--3705-80: No special feature required  
--3708: No special feature required  
--3710: #7001  
--3725-1, 2, 3726: #4911 (24)  
--3771, 3774, 3775: #1481 and #3701  
--3776-1, 2, 3777-1, 2: #1481 and #3701  
--3776-3, 4, 3777-3, 4: #3701  
--3791: #3701 and #6302 or #6303 (6)  
--3845, 3846: (5, 15) <  
--(Canada and Japan only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2: (22)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310  
--4987: #4730  
--5110: #2074 and #3701  
--5231: #4780, #9483 and #9754  
--5251-2, 12: #3701  
--5294-1: #3701 <  
--(Japan only > 5294-K01: #3701 <  
--(Canada and Japan only > 5285, 5288: #3701  
--5340: #3701 (10)

--5360: #3701 or #4552  
--5362: #2920  
--5364: (26)  
--5381: #3701  
--5525: #3701 or #3702  
--8101, 8130, 8140 A, B: #1602 and #3701  
--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (12)  
--8775: #3701 and #9493  
--8815-1: #3701  
--9373, 9375, 9377: #6030, #6031 <

### AUTOMATIC CALLING ON THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

--(Canada only > On FACILITY C1M: via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

--2701: #1302  
--3138: #1290  
--3704, 3705-II: #4715  
--3705-80: #6714  
--3725-1, 2, 3726: #4911 <  
--(Canada only > 4331, 4361: #1020  
--4987: #4743  
--9373, 9375, 9377: #6030, #6031 <

--(Canada only > On FACILITY C2M: Via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

--2701: #1314  
--3138: #1290  
--3704, 3705: #4715  
--3705-80: #6714  
--3725-1, 2, 3726: #4911 <  
--(Canada only > 4331, 4361: #1020  
--4987: #4743  
--5340: #5411 or #5412 or #5413 or #5314  
--5360: #5411 or #4553  
--5362: #2920  
--5381: #5760  
--5525: #1315 or #1316  
--9373, 9375, 9377: #6030, #6031 <

--(Canada only > On FACILITY C3M: Via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

## MACHINES

--2701: #1314  
--3138: #1290  
--3704, 3705-II: #4715  
--3705-80: #6714  
--3725-1, 2, 3726: #4911<)  
--(Canada only > 4331, 4361: #1020  
--4987: #4743  
--5340: #5411 or #5412 or #5413 or #5414  
--5360: #5411 or #4553  
--5362: #2920  
--5381: #5760  
--5525: #1315 or #1316  
| --9373, 9375, 9377: #6030, #6031<)

--(Canada only > On FACILITY C4M: Via a stand-alone ACE attached under the provisions of the IBM Multiple Supplier Systems Policy (2)

--2701: #1314  
--3138: #1290  
--3704, 3705-II: #4715  
--3705-80: #6714  
--3725-1, 2, 3726: #4911<)  
--(Canada only > 4331, 4361: #1020  
--4987: #4743  
--5340: #5411 or #5412 or #5413 or #5414  
--5360: #5411 or #4553  
--5362: #2920  
--5381: #5760  
--5525: #1315 or #1316  
| --9373, 9375, 9377: #6030, #6031<)

### --Notes for Chart C:

1. (Except Canada > Not all country public switched telephone networks perform equally well, and reliable transmission at 300 bps, 1200 bps, 2400 bps or 4800 bps cannot be assumed. Your teleprocessing coordinator can advise you further in this matter. Prior to a proposal to a customer, Country Systems Assurance must make the final judgement as to the speed or speeds which can be safely proposed. Review Section 4, "Teleprocessing Marketing Practices", for compliance before making any proposal for operation on the public switched telephone network.<) (Canada only > Attachment of these modems to the public switched telephone network will be via a telephone company supplied CBS Data Coupler (for automatic or manual answering) or CDT Data Access Arrangement (for manual only answering). It will be the customer's responsibility to assure that the telephone line is terminated in the proper coupler/data access arrangement for the mode of operation he desires.<)
2. Contact IBM for more information on attachable DCEs, services, etc.

3. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
4. Specify codes #967X, #968X and #969X on the 4331 or 4361 stipulate in which protocol the 4331 or 4361 is to communicate and to which line position on the 4331 or 4361 that protocol is to be assigned, with the "X" in each case being the line position. See M4331 or 4361 pages for details. Note: On the 4361, specify codes #967X and #969X are not required.
5. No special feature is required to attach this DTE to this facility.
6. 3791 switched network operation is supported at the 3704, 3705 or 3725-1, 2, 3726 nonswitched programming. Special procedures are required to establish and disconnect the link. Refer to VTAM and 3790 operation instructions for the appropriate procedures.
7. The 2701 feature code listed is for the attachment of a single synchronous communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached.
8. The 3602 will operate on this facility at 1200 bps only. The operational speed of the other DTEs on this facility is determined by:
  - A customer-accessible switch on the 2701, 3138, 3274, 3276, 3651, 3684, 3741, 3771, 3774, 3775, 4952, 4955, 4959, 4987, 5110, 5251, 5265, and 5340.
  - The installation of a "Speed specify" on the 3704, 3705, 5381, 8101, 8130 and 8140.
  - A customer-initiated keyboard request on the 3791, 4331, 4361 or 5231.
  - An Operator Command Language (OCL) instruction on the 6670.
  - The options chosen at the generation of the control program of the 3725-1, 2.
9. A 3705, equipped with the "Remote Program Loader" feature, may serve as a "Remote" and communicate with a "Local" 3704 or 3705. Their primary communication link must be a non-switched line, and, therefore, communication over this facility between a "Remote" and a "Local" 3704 or 3705 can only be as a secondary, alternate, path to the primary nonswitched communication link.
10. The listed 5340 feature codes are for the attachment of a single communication line. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
11. These feature codes are for the attachment of a modem which does not provide its own clocking. (Except Canada > The 3976 model 3 Modem is such a modem and, therefore, requires these feature codes.<) This class of modem should always be used on international connections.
12. These feature codes are for the attachment of a modem which does provide its own clocking. This class of modem may only be used on intranational connections.
13. (Canada only > There are two types of 2400 bps Integrated Modems that are not compatible with each other. The first type, #4761 and #5610 are line compatible and suitable for communication with each other and with an 3872 Modem equipped with #7941 or #7942. The second type, #5641, is line compatible and suitable for communication with another #5641 or with a 3863 model 2 Modem.<) (Except Canada > The 2400 bps Integrated Modem #5641 is line compatible and suitable for communication with a 3863 model 2 Modem.<)
14. CCITT V.23 modems providing modem clocking and CCITT V.26 modems using Alternative B coding are not truly data transparent, in that the transmission of a long string of zeros can cause the receiving modem to lose synchronization. Therefore, unless the PTT can assure that the modems will not lose synchronization during the transmission of zeros for up to one second, NRZI coding must be used in the SDLC proto-

col, and transparent mode may not be used in the BSC protocol. See your PTT coordinator for details.

15. The 3845 and 3846 are data encryption/decryption devices inserted between the DTE and the DCE. The DCE must satisfy the requirements of (Canada only > EIA RS-232-C <) (Except Canada > CCITT Recommendations V.24 and V.28 <) to allow this insertion.
16. The 4800 bps Integrated Modems, #536X and #5741, are line compatible and suitable for communication with each other, and with the 3864 model 2 Modem. The "X" in the #536X feature code is the line position on the 5340 in which this modem will be mounted. See the M5340 pages for details. (Canada only > The 3689 provides a 4800 bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another 3689 or with an 3864 model 2 Modem. <)
17. Ignore this note.
18. (Except Canada > The 1200 bps Integrated Modem is line compatible and suitable for communication at 1200 bps with a 3976 model 3 Modem. A 3767 with a 1200 bps integrated modem may also communicate in start/stop mode at 300 bps

with a 3704, 3705, 3725-1, 2, or 3726 attaching a 3976 model 3 Modem. <) (Canada only > Ignore this note. <)

19. Ignore this note.
20. Ignore this note.
21. Note number not used.
22. For communication in SNA/SDLC protocol, no special feature is required on the 4701, 4702. For communication in BSC protocol, #1422 is required. In either protocol, the 4701/4702 require that clocking be provided by the attached stand-alone DCE. (Except Canada > The 4701 and 4702 do NOT, therefore, support attachment of the 3976 model 3 Modem. <)
23. Note number not used.
24. A 3725-1, 2 or 3726 may serve as a "Remote" and communicate with a "Local" 3704, 3705, 3725-1, 2, or 3726. Their primary communication link must be a nonswitched line and, therefore, communication over this facility between a "Remote" and a "Local" 3704, 3705 or 3725-1, 2, 3726 can only be as a secondary, alternate path to the primary nonswitched communication link.
25. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.

## 2700 CHART D - NONSWITCHED VOICE GRADE LINES

### CHART D - NONSWITCHED VOICE GRADE LINES

For each machine type, the special features required for attachment are shown.

#### FACILITY DA1

Point-to-point or multipoint start/stop operation at 134.5, 200, or 300 bps on a half-duplex (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via an integrated modem. (1, 2)

--3704, 3705-II: #4742 (on 2 wires) or #4743 (on 4 wires) and #9606 (at 134.5 bps only) or #4781 or #4785 and #9612 (at 300 bps only)

--3792: #5400 (at 134.5 bps only)

--(Except Canada > 4331, 4361: #1601, #2832, #4696 and #968X (4) (at 300 bps only) <)

#### (EXCEPT CANADA > FACILITY D1

Point-to-point or multipoint start/stop operation at 134.5, 200 or 300 bps on a half-duplex voice grade line via a 3976 model 1 Modem (at 134.5 or 200 bps), a 3976 model 3 Modem (at 300 bps on 4 wire lines) or a PTT mandatory modem complying with CCITT Recommendations V.21, V.24 and V.28 and ISO Standard 2110. (1) <)

--(Except Canada > 2701: #4640, #9581 and #2910 (at 134.5 bps only) <)

--(Except Canada > 3101: (6)

--3138: #4640 and #9721 (3) <)

--(Except Canada > 3161, 3163: (6) <)

--(Except Canada > 3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps), #2717 (at 200 bps) or #9612 (at 300 bps)

--3705-80: No special feature required at 134.5 bps, #1412 (at 200 bps) or #1413 (at 300 bps)

--3708: No special feature required

--3710 <): (Except Canada > #7001 or #7015 (point-to-point only). <)

--(Except Canada > 3725-1, 2, 3726: #4911 and #4666 (35)

--3792: #3701 (at 134.5 bps only)

--3845, 3846: (6, 16) <)

--(Except Canada > 4331, 4361: #1601, #3701, #4696 and #968X (4) (at 134.5 or 300 bps only)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--5110: #1525 (at 134.5 or 300 bps, point-to-point only)

--5208: No special feature required (300 bps only)

--6360: #3704 or #3705 or #3707 (point-to-point only)

--6580: #3705 (point-to-point only)

--8101, 8130 A, 8140 A, B: #1603 and #3701 (at 134.5 or 300 bps, point-to-point only) <)

--8130 B: #1603 and #3701 (point-to-point only)

--(Except Canada > 9373, 9375, 9377: #6030, #6031 (134.5 or 300 bps only) <)

#### (CANADA ONLY > FACILITY D1M

Point-to-point or multipoint start/stop operation at 134.5 or 300 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--2701: #4640 and #9581 (at 134.5 bps only)

--3101: (6)

--3138: #4640 and #9721 (3)

--3161, 3163: (6) <)

--(Canada only > 3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)

--3705-80: No special feature required at 134.5 bps or #1413 (at 300 bps)

--3708: No special feature required

--3710: #7001 or #7015 (point-to-point only)

--3725-1, 2, 3726: #4911 and #4666 (35)

--3792: #3701 (at 134.5 bps only)

--3845, 3846: (6, 16) <)

--(Canada only > 4331, 4361: #1601, #3701, #4696 and #968X (4)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--5110: #1525 (point-to-point only)

--6360: #3704 or #3705 or #3707 (point-to-point only)

--6580: #3705 (point-to-point only)

--6733: (at 300 bps only) (point-to-point only) (6)

--8101, 8130 A, <) 8130 B, (Canada only > 8140 A, B: #1603 and #3701 (point-to-point only)

--9373, 9375, 9377: #6030, #6031 <)

#### FACILITY DA2

Point-to-point or multipoint start/stop operation at 600 bps on a duplex (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via an integrated modem. (1, 2)

--3704, 3705-II: #4742 (on 2 wires) or #4743 (on 4 wires) and #9607

--(Canada only > 4331: #1601, #4696, #4781 and #968X (4) <)

--(Except Canada > 4331: #1601, #4696, #4832 and #968X (4) <)

--4987: #4748

(EXCEPT CANADA > FACILITY D2

Point-to-point or multipoint start/stop operation at 600 bps on a duplex nonswitched voice grade line via a 3976 model 3 Modem. (1) <

--(Except Canada > 2701: #4640 and #9582 or #4648

--3101: (6)

--3138: #4640 and #9721 (3) <

--(Except Canada > 3161, 3163: (6) <

--(Except Canada > 3704, 3705-II: #4711 or #4714 and #9607

--3705-80: #1414

--3708: No special feature required

--3710 <: (Except Canada > #7001 or #7015 (point-to-point) <

--(Except Canada > 3725-1, 2, 3726: #4911 and #4666 (35)

--3845, 3846: (6, 16) <

--(Except Canada > 4331, 4361: #1601, #3701, #4696 and #968X (4)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--8101, 8140 A, B: #1603 and #3701 (point-to-point only) (27)

| --8550, 8560, 8580: Base Machine, also adapters #3033 (P/N 6450347) and #3042 (P/N 6450348) (39)

--9373, 9375, 9377: #6030, #6031 <

(CANADA ONLY > FACILITY D2M

Point-to-point or multipoint start/stop operation at 600 bps on a duplex nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--2701: #4640 and #9582 or #4648

--3101: (6)

--3138: #4640 and #9721 (3)

--3161, 3163: (6) <

--(Canada only > 3704, 3705-II: #4711 or #4714 and #9607

--3705-80: #1414

--3708: No special feature required

--3710: #7001 or #7015

--3725-1, 2, 3726: #4911 and #4666 (35)

--3845, 3846: (6, 16) <

--(Canada only > 4331, 4361: #1601, #3701, #4696 and #968X (4)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--8101, 8140 A, B: #1603 and #3701 (point-to-point only) (27)

| --8550, 8560, 8580: Base Machine, also adapters #3033 (P/N 6450347) and #3042 (P/N 6450348) (39)

--9373, 9375, 9377: #6030, #6031 <

FACILITY DA3

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via an integrated modem. (1, 2, 7(Except Canada >, 24 <))

--S/S Machine Types

--3704, 3705-II: #4781 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps)

--3791: #5500 and #6301 (14) or #3210 and #4781 (9)

--(Canada only > 4331: #1601, #4696, #4781 and #968X (4) <

--Sync Machine Types

--(Canada only > 2701: #4781, #7698 and #7692 (at 1200 bps) or #7401 (at 600/1200 bps) (8) <

--(Except Canada > 2701: #7698, #4781 and #2931 (at 600 bps), #7692 (at 1200 bps) or #2973 (at 600/1200 bps) (8) <) (Japan only > (#2970 is required in place of #7698) <

--3274-51C: #5500 and #6301

--3276-1, 4: #5500 and #6301

--3276-11, 14: #5500 and #6301 (14)

--3602: #5500 and #4501 or #6301 (14) or #8001 (5)

--3603-1: (5, 6)

--3624: #5500 and #1421 or #6301 (7, 14) or #8001 (5, 7)

--(Canada only > 3684: #5530 and #9482 (14) <

--(Except Canada > 3684: #5530, #2834 and #9482 (14) <

--3704, 3705-II: #4781 or #4784 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (14)

--3741: #5500

--3771, 3774, 3775: #1482 and #5500 (14)

--3791: #5500 and #6301 (14) or #3210 and #4781 (9)

--(Canada only > 4331: #1601, #4696, #4781 and #967X or #969X (4) <

--(Except Canada > 4331: #1601, #2832, #4696 and #967X or #969X (4) <

--4987: #4748

--5110-1, 2: #5500

--5231: #5500 and #9334

--5251-2, 12: #5500

--5285, 5288: #9751 and #9481 or #9482 (14)

--5340: #5500 (11, 14)

--5381: #5500 (14)

--(Canada only > 5525: #1750 and #5500 or #1751 and #5502 <

--6670: #5510

--8101, 8130 A, 8140 A, B: #5500 and #1601 or #1603 (14)  
--8775: #1488 and #5500

## FACILITY DAB3

Point-to-point or multipoint synchronous operation at 600/1200 bps on a (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) with backup on the public switched telephone network via an integrated modem. (1, 2, 7, 21)

--(Canada only > 3274-51C: #5507 or #5508 and #6301  
--3276-1, 4: #5507 or #5508  
--3276-11, 14: #5507 or #5508 (14)  
--5110-1, 2: #5508  
--5285, 5288: #5508 (14)  
--5381: #5508 (14) <  
--(Except Canada > 3274-51C: #5508 and #6301  
--3276-1, 4: #5508  
--3276-11, 14: #5508 (14) <  
--6670: #5508

## (EXCEPT CANADA > FACILITY D3

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a nonswitched voice grade line via a 3976 model 3 Modem or a PTT mandatory modem complying with CCITT Recommendation V.23, V.24 and V.28 and ISO Standard 2110. (1, 7, 19)

--S/S Machine Types <  
--(Except Canada > 3101: (6) <  
--(Except Canada > 3161, 3163: (6) <  
--(Except Canada > 3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12)  
--3705-80: #1415 (10) or no special feature required (11)  
--3708: No special feature required  
--3710 <: (Except Canada > #7001 or #7015 (point-to-point) <  
--(Except Canada > 3725-1, 2, 3726: #4911 and #4666 (12, 35)  
--3845, 3846: (6, 16) <  
--(Except Canada > 4331, 4361: #1601, #3701, #4696 and #968X (4, 12)  
--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096 (12) or #1310 (1200 bps only)  
--4987: #4730 or #4731 (12)  
--Sync Machine Types <  
--(Except Canada > 2701: #2899 and #2931 (at 600 bps), #7692 (at 1200 bps) or #2973 (at 600/1200 bps) (8, 12) < (Except Canada > (#2970 is required in place of #2988) <  
--(Except Canada > 3138: #4640 and #9649 (3, 12) or #4640, #9609 and #9649 (3, 13)

--3274-51C: #3701 and #6301

--3276-1, 4: #3701, #9491 and #6301 (12) or #3701, #9491 and #6302 (13)

--3276-11, 14: #3701, #9491 and #6301 (12, 14) or #3701, #9491 and #6302 (13, 14)

--3602: #3701 and #4501 or #6301 (5, 13, 14) or #3701 and #4502 or #6302 (5, 13, 14)

--3603-2: (6, 12) or #6352 (5, 13) <

--(Except Canada > 3624: #3701 and #1421 or #6301 (7, 13, 14) or #3701 and #1422 or #6302 (7, 13, 14) <

--(Except Canada > 3631, 3632: #3701 and #6301 (12, 14) or #3701 and #4502 or #6302 (13, 14)

--3651-25, 50: #2858, #2982 and #2823 or #2824 (12, 14)

--3651-75: #2858, #2982 and #2823 or #2824 (12, 14) or #2703 and 2721 (12)

--3684: #3701 and #9695 (12, 14) or #3701 and #9820 (13, 14) <

--(Except Canada > 3694: #3701 and #4501 (12, 14) or #3701 and #4502 (13, 14) <

--(Except Canada > 3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12, 14) or #4714 (13, 14)

--3705-80: #1415 (10) or no special feature required (11)

--3708: No special feature required

--3710 <: (Except Canada > #7001 <

--(Except Canada > 3725-1, 2, 3726: #4911 and #4666 (12, 14, 35) or #4911 (13, 14)

--3741: #2983 and #7705 (12) <

--(Except Canada > 3771, 3774, 3775: #1482 and #3701 (12, 14) or #1481 and #3701 (13, 15)

--3791: #3701 and #6301 (12, 14) or #3701 and #6302 or #6303 (13, 14) or #3703 and #3210 (9, 12) or #3703 and #3211 (9, 13)

--3845, 3846: (6, 16) <

--(Except Canada > 4331, 4361: #1601, #3701, #4696 and #967X or #969X (4, 12) or #1601, #3701, #4695 and #967X or #969X (4, 13)

--4701-1, 2, 3: (14, 31) <

--(Except Canada > 4702: (14, 31) <

--(Except Canada > 4730: (1200 bps only) (6, 13, 14) <

--(Except Canada > 4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310 (1200 bps only)

--4987: #4730 or #4731 (14)

--4975-1R, 2R: (1200 bps only) (7)

--5110: #2074 and #3701

--5231: #2074, #4780, #9334, #9751 and #9481 or #9482 (12) or #2074, #4780, #9751 and #9481 or #9482 (13)

--5251-2, 12: #3701 and #4703 (12) or #3701 (13)

--5265: #3701

## MACHINES

--5285, 5288: #3701, #9750 or #9751 and #9481 or #9482 (14)  
--5340: #3701 and #4703 (11, 13, 14) or #3701 (11, 13, 14)  
--5360: #3701 and #5321 (12, 14) or #3701 (13, 14)  
--5362: #2920 (12, 13, 14)  
--5381: #3701 (14)  
--5525: #1750 and #3701 or #1751 and #3702 (12) or #3701 or #3702 (13)  
--6360: #3704 or #3705 or #3707 (12) (point-to-point only)  
--6580: #3705 (12) (point-to-point only)  
--6670: #3701 (12, 14)  
--7426: (6)  
--8101, 8130 A, 8140 A, B: #3701 and #1601 or #1603 (12, 14) or #3701 and #1602 or #1604 (13, 14) or #3701 and #1605 (12, 13) <  
--(Except Canada > 8130 B: #3701 and #1603 (12, 14) or #3701 and #1602 or #1604 <  
--(Except Canada > 8140 C: #1610, #1611, #1620, #1621 or #1630 (13, 14) or #1622 or #1623 (12, 13, 14)  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (13, 14)  
--8775: #1488, #3701 and #9494 (12) or #3701 and #9494 (13)  
--9373, 9375, 9377: #6030, #6031 <)

### (CANADA ONLY > FACILITY D3M

Point-to-point or multipoint start/stop or synchronous operation at 600/1200 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1, 7)

#### --S/S Machine Types

--3101: (6)  
--3161, 3163: (6) <  
--(Canada only > 3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12)  
--3705-80: #1415 (10) or no special feature required (11)  
--3708: No special feature required  
--3710: #7001 or #7015 (point-to-point only)  
--3725-1, 2, 3726: #4911 and #4666 (12, 35)  
--3845, 3846: (6, 16) <  
--(Canada only > 4331, 4361: #1601, #3701, #4696 and #968X (4, 12)  
--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096 (12) or #1310 (1200 bps only)  
--4975-1R, 2R: (1200 bps only) (7)  
--4987: #4730 or #4731 (12)  
--6733: (at 1200 bps only) (point-to-point only) (6)  
--8373, 9375, 9377: #6030, #6031  
--Sync Machine Types

--2701: #7698 and #7692 (at 1200 bps) or #7401 (at 600/1200 bps) (8, 12)  
--3138: #4640 and #9649 (3, 12) or #4640, #9609 and #9649 (3, 13)  
--3232-1: (6)  
--3274-51C: #3701 and #6301  
--3276-1, 4: #3701, #6301 and #9491 (12) or #3701, #6302 and #9491 (13)  
--3276-11, 14: #3701, #6301 and #9491 (12, 14) or #3701, #6302 and #9491 (13, 14)  
--3602: #3701 and #4501 or #6301 (5, 13, 14) or #3701 and #4502 or #6302 (5, 13, 14)  
--3603-2: (6, 12) or #6352 (5, 13)  
--3624: #3701 and #1421 or #6301 (7, 13, 14) or #3701 and #1422 or #6302 (7, 13, 14)  
--3631, 3632: #3701 and #6301 (12, 14) or #3701 and #4502 or #6302 (13, 14)  
--3684: #3701 and #9695 (12, 14) or #3701 and #9820 (13, 14)  
--3694: #3701 and #4501 (12, 14) or #3701 and #4502 (13, 14)  
--3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps), #9608 (at 1200 bps) or #9615 (at 600/1200 bps) (12, 14) or #4714 (13, 14)  
--3705-80: #1415 (10) or no special feature required (11)  
--3708: No special feature required  
--3710: #7001  
--3725-1, 2, 3726: #4911 and #4666 (12, 14, 35) or #4911 (13, 14)  
--3741: #7705 and #9122 (12)  
--3771, 3774, 3775: #1482 and #3701 (12, 14) or #1481 and #3701 (13, 15)  
--3791: #3701 and #6301 (12, 14) or #3701 and #6302 or #6303 (13, 14) or #3703 and #3210 (9, 12) or #3703 and #3211 (9, 13)  
--3845, 3846: (6, 16) <  
--(Canada only > 4331, 4361: #1601, #3701, #4696 and #967X or #968X (4, 12) or #1601, #3701, #4695 and #967X or #969X (4, 13)  
--4701-1, 2, 3, 4702: (14, 31)  
--4730, 4736: (1200 bps only) (6, 13, 14)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310 (1200 bps only)  
--4975-1R, 2R: (1200 bps only) (7)  
--4987: #4730 or #4731 (14)  
--5110: #2074 and #3701  
--5150: (6, 13)  
--5231: #2074, #4780, #9334, #9751 and #9481 or #9482 (12) or #2074, #4780, #9751 and #9481 or #9482 (13)  
--5251-2, 12: #3701 and #4703 (12) or #3701 (13)  
--5265: #3701  
--5285, 5288: #3701 (14)

## MACHINES

--5340: #3701 and #4703 (11, 13, 14) or #3701 (11, 13, 14)  
 --5360: #3701 and #5321 (12, 14) or #3701 (13, 14)  
 --5362: #2920 (12, 13, 14)  
 --5364: (14, 37)  
 --5381: #3701 (14)  
 --5525: #1750 and #3701 or #1751 and #3702 (12) or #3701 or #3702 (13)  
 --6360: #3704 or #3705 or #3707 (12) (point-to-point only)  
 --6580: #3705 (12) (point-to-point only)  
 --6670: #3701 (12, 14)  
 --7426: (6)  
 --8101, 8130 A, 8140 A, B: #3701 and #1601 or #1603 (12, 14) or #3701 and #1602 or #1604 (13, 14) or #3701 and #1605 (12, 13) <  
 --(Canada only > 8130 B: #3701 and #1603 (12, 14) or #3701 and #1602 or #1604 <  
 --(Canada only > 8140 C: #1610, #1611, #1620, #1621 or #1630 (13, 14) or #1622 or #1623 (12, 13, 14)  
 --8150: #1732, #1733, #1734, #1735, #1763 or #1764 (13, 14)  
 --8775: #1488, #3701 and #9494 (12) or #3701 and #9494 (13)  
 --9373, 9375, 9377: #6030, #6031 <

### (EXCEPT CANADA > FACILITY D4

Point-to-point synchronous operation at 2000 bps on a nonswitched voice grade line via a 3977 model 2 Modem. (1, 25)

--2701: #2899 and #2932 (8) <  
 --(Except Japan > 3232-1: (6) <  
 --(Except Canada > 3704, 3705-II: #4714 or #4718 and #9609 (14, 17)  
 --3705-80: No special feature required  
 --3708: No special feature required  
 --3710 <: (Except Canada > #7001 <

### (CANADA ONLY > FACILITY D4M

Point-to-point or multipoint synchronous operation at 2000 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--2701: #7698 (8)  
 --3138: #4640, #9609 and #9649 (3)  
 --3232-1: (6)  
 --3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)  
 --3276-1, 4: #3701, #6302 and #9491  
 --3276-11, 14: #3701, #6302 and #9491 (14)  
 --3602: #3701 and #4502 or #6302 (14)  
 --3624: #3701 and #1422 or #6302 (14)

--3631, 3632: #3701 and #4502 or #6302 (14)  
 --3694: #3701 and #4502 (14)  
 --3704, 3705-II: #4714 or #4718 (14, 17)  
 --3705-80: No special feature required  
 --3708: No special feature required  
 --3710: #7001 or #7015 (point-to-point only)  
 --3741: #9120  
 --3771, 3774, 3775: #1481 and #3701 (14)  
 --3776-1, 2: #1481 and #3701 (14)  
 --3845, 3846: (6, 16)  
 --3791: #3701 and #6302 or #6303 (14) or #3211 and #3703 (9) <  
 --(Canada only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
 --4701-1, 2, 3, 4702: (14, 31)  
 --4730, 4736: (6, 13, 14)  
 --4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310  
 --4987: #4730 or #4731  
 --5110: #2074 and #3701  
 --5150: (6, 13)  
 --5231: #2074, #4780 and #9481 or #9482  
 --5251-2, 12: #3701  
 --5265: #3701  
 --5285, 5288: #3701 (14)  
 --5340: #2500 and #3701 (11, 14)  
 --5360: #3701 or #4552 (14)  
 --5362: #2920 (14)  
 --5364: (14, 37)  
 --5381: #3701 (14)  
 --5525: #3701 or #3702  
 --6360: #3704 or #3705 or #3707 (point-to-point only)  
 --6580: #3705 (point-to-point only)  
 --6670: #3701 (14)  
 --7426: (6)  
 --8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13) <  
 --(Canada only > 8130 B: #3701 and #1603 (12, 14) or #3701 and #1602 or #1604 <  
 --(Canada only > 8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
 --8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)

**MACHINES**

--8775: #3701 and #9494

--8815-1: #3701 (14) <

**FACILITY DA5**

Point-to-point or multipoint synchronous operation at 2400 bps on a (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via an integrated modem. (1, 2, 18)

--3274-31C: #5640, #9112 and #6302 or #6303

--3659: (6)

--3669: (6)

--3704, 3705-II: #4751 or #4752 or #4754 or #4755 (14, 17)

--3774, 3775, 3776-1, 2: #5600 or #5602 (14)

--3842: (6, 10)

--5251-2, 12: #5640

--5340: #5600 or #5601 or #5602 (14)

--5364: (14, 37)

--5381: #5640 (14)

**(CANADA ONLY > FACILITY DAB5)**

Point-to-point or multipoint synchronous operation at 2400 bps on a <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) (Canada only > with backup on the public switched telephone network via an integrated modem. (1, 2, 19, 20)

--3774, 3775, 3776-1, 2: #7951 and #5600 or #5602 (14)

--3842: #7951 (10)

--5340: #7951 and #5600 or #5601 or #5602 (11, 14) <

**FACILITY D5**

Point-to-point or multipoint synchronous operation at 2400 bps on a (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via a 3863 mdl 1 Modem, a 3868 mdl 1 Rack-Mounted Modem (Canada only > or a 3872 Modem. <) (Except Canada > or a 3872 Modem or a PTT-mandatory modem complying with CCITT Recommendations V.24, V.26 and V.28 and ISO Standard 2110. <) (1, 19, 23)

--(Canada only > 2701: #7698 (8) <

--(Except Canada > 2701: #2899 (8) <) (Japan only > (#2970 is required in place of #2899) <)

--3138: #4640, #9609 and #9649 (3)

--(Except Japan > 3232-1: (6) <

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)

--3274-51C: #3701 and #6302 or #6303 (14)

--(Japan only > 3274-52C: #3701 and #6302 or #6303 (14) <

--3276-1, 4: #3701, #6302 and #9491

--3276-11, 14: #3701, #6302 and #9491 (14)

--3602: #3701 and #4502 or #6302 (14)

--3603-2: #6352

--3624: #3701 and #1422 or #6302 (14)

--3631, 3632: #3701 and #4502 or #6302 and/or #3211 and #3703 (14)

--(Canada only > 3651-25, 50: #9121 or #9122 (14, 22)

--3651-75: #9121 or #9122 or #6185 (14, 22) <

--(Except Canada > 3651-25, 50: #2891 and #2825 or #2826 (14, 22)

--3651-75: #2891 and #2825 or #2826 or #6185 and #2727 (14, 22) <

--3684: #3701 and #9822 (14)

--(Japan only > 3694: #3701 and #4502 (14) <

--3704, 3705-II: #4714 or #4718 (14, 16, 17)

--3705-80: No special feature required

--3708: No special feature required

--3710: #7001

--3725-1, 2, 3726: #4911 (14, 33, 34)

--3741: #9121

--3771, 3774, 3775: #1481 and #3701 (14)

--3776-1, 2, 3777-1, 2: #1481 and #3701 (14)

--3776-3, 4, 3777-3, 4: #3701 (14)

--3791: #3701 and #6302 or #6303 (14) or #3211 and #3703 (9)

--3843: (6, 10)

--3845, 3846: (6, 16)

--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)

--4701-1, 2, 3: (14, 31)

--4730, 4736: (6, 13, 14)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310

--4975-1R, 2R: (7)

--4987: #4730 or #4731 (14)

--5110: #2074 and #3701

--(Canada only > 5150: (6, 13) <

--5231: #4780, #9753 and #9481 or #9482

--5251-2, 12: #3701

--5265: #3701

--5285, 5288: #3701 (14)

--5294-1: #3701

--(Except Canada > 5294-K01: #3701 <

--5340: #2500 and #3701 (11, 14)

--5360: #3701 or #4552 (14)



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# MACHINES

--5362: #2920 (14)  
--5364: (14, 37)  
--5381: #3701 (14)  
--5525: #3701 or #3702  
--6360: #3704 or #3705 or #3707 (point-to-point only)  
--6580: #3705 (point-to-point only)  
--6670: #3701 (14)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)  
--8130 B: #3701 and #1602 or #1604 (14)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)  
--8775: #3701 and #9494  
--8550, 8560, 8580: #3042 (P/N 6450348) (40)  
--8815-1: #3701 (14)  
--9373, 9375, 9377: #6030, #6031

## (CANADA AND JAPAN ONLY > FACILITY D5M

Point-to-point or multipoint synchronous operation at 2400 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--2701: #7698 (8)  
--3138: #4640, #9609 and #9649 (3)  
--3232-1: (6)  
--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)  
--3274-51C: #3701 and #6302 or #6303 (14)  
--3276-1, 4: #3701, #6302 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (14)  
--3602: #3701 and #4502 or #6302 (14)  
--3603-2: #6352  
--3624: #3701 and #1422 or #6302 (14)  
--3631, 3632: #3701 and #4502 or #6302 and/or #3211 and #3703 (14)  
--3651-25, 50: #9121 or #9122 (14, 22)  
--3651-75: #9121 or #9122 (14) or #6185 (22)  
--3684: #3701 and #9822 (14)  
--3694: #3701 and #4502 (14)  
--3704, 3705-II: #4714 or #4718 (14, 16, 17)  
--3705-80: No special feature required  
--3708: No special feature required  
--3710: #7001

--3725-1, 2, 3726: #4911 (14, 33, 34)  
--3741: #9121  
--3771, 3774, 3775: #1481 and #3701 (14)  
--3776-1, 2, 3777-1, 2: #1481 and #3701 (14)  
--3776-3, 4, 3777-3, 4: #3701 (14, 15)  
--3791: #3701 and #6302 or #6303 (14) or #3211 and #3703 (9)  
--3843: (6, 10)  
--3845, 3846: (6, 16) <  
--(Canada and Japan only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2, 3, 4702: (14, 31)  
--4730, 4736: (6, 13, 14)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310  
--4975-1R, 2R: (8)  
--4987: #4730 or #4731 (14)  
--5110: #2074 and #3701  
--5150: (6, 13)  
--5231: #4780, #9753 and #9481 or #9482  
--5251-2, 12: #3701  
--5265: #3701  
--5285, 5288: #3701 (14)  
--5294-1: #3701 <  
--(Japan only > 5294-K01: #3701 <  
--(Canada and Japan only > 5340: #2500 and #3701 (11, 14)  
--5360: #3701 or #4552 (14)  
--5362: #2920 (14)  
--5364: (14, 37)  
--5381: #3701 (14)  
--5525: #3701 or #3702  
--6360: #3704 or #3705 or #3707 (point-to-point only)  
--6580: #3705 (point-to-point only)  
--6670: #3701 (14)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)  
--8130 B: #3701 and #1602 < (Canada only > or #1604 < (Canada and Japan only > (14)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)  
--8550, 8560, 8580: #3042 (P/N 6450348) (40)

**MACHINES**

--8775: #3701 and #9494

--8815-1: #3701 (14)

--9373, 9375, 9377: #6030, #6031 (<)

**FACILITY D5SB**

Point-to-point or multipoint synchronous operation at 2400 bps on a (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via a 3863 model 1 Modem equipped with #7953 (Canada only > or a 3872 Modem equipped with #7951 or #7952. <) (1, 20, 23)

--(Canada only > 2701: #7698 (8) <)

--(Except Canada > 2701: #2899 (8) <) (Japan only > (#2970 is required in place of #2899) <)

--3138: #4640, #9609 and #9649 (3)

--(Except Japan > 3232-1: (6) <)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)

--3274-51C: #3701 and #6302 or #6303 (14)

--3276-1, 4: #3701, #6302 and #9491

--3276-11, 14: #3701, #6302 and #9491 (14)

--3602: #3701 and #4502 or #6302 (14)

--3631, 3632: #3701 and #4502 or #6302 (14)

--(Canada only > 3651-25, 50: #9121 or #9122 (14)

--3651-75: #9121 or #9122 (14) <)

--(Except Canada > 3651-25, 50: #2891 and #2825 or #2826 (14)

--3651-75: #2891 and #2825 or #2826 (14) <)

--3684: #3701 (14)

--(Canada only > 3694: #3701 and #4502 (14) <)

--(Japan only > 3694: #3701 and #4502 (14) <)

--3704, 3705-II: #4714 (14, 16, 17)

--3705-80: No special feature required

--3708: No special feature required

--3710: #7001

--3725-1, 2, 3726: #4911 (14, 33, 34)

--3771, 3774, 3775: #1481 and #3701 (14)

--3776-1, 2, 3777-1, 2: #1481 and #3701 (14)

--3776-3, 4, 3777-3, 4: #3701 (14, 15)

--3791: #3701 and #6302 or #6303 and/or #3211 and #3703 (9)

--3843: (6, 10)

--3845, 3846: (6, 16)

--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)

--4701-1, 2, 3: (14, 31)

--4702: (14, 31)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310

--4987: #4730 or #4731 (14)

--5110: #2074 and #3701

--(Canada only > 5150: (6, 13) <)

--5251-2, 12: #3701 and #9492

--5285, 5288: #3701, #9753 and #9481 or #9482 (14)

--5294-1: #3701 (36)

--(Except Canada > 5294-K01: #3701 (36) <)

--5340: #2500 and #3701 (11, 14)

--5360: #3701 or #4552 (14)

--5362: #2920 (14)

--5364: (14, 37)

--5381: #3701 (14)

--5525: #3701 or #3702

--6360: #3704 or #3705 or #3707 (point-to-point only)

--6580: #3705 (point-to-point only)

--6670: #3701 (14)

--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1606 (13)

--8130 B: #3701 and #1602 or #1604 (14)

--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623

--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)

| --8550, 8560, 8580: #3042 (P/N 6450348) (40)

--8775: #3701 and #9494

--8815-1: #3701 (14)

--9373, 9375, 9377: #6030, #6031

**FACILITY DA6**

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via an integrated modem. (1, 2, 21)

---- 3274-31C: #5740 or #9112 and #6302 or #6303 (14)

---- 3776-1, 2: #5700 or #5702 (14)

---- 5251-2, 12: #5740

--5340: #5351 (11, 14)

--5381: #5740 (14)

**(CANADA ONLY > FACILITY DAB6**

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex <) (Canada only > Schedule 4, Type 4A Data Channel (or

equivalent) <) (Canada only) > with backup on the public switched telephone network via an integrated modem. (1, 2, 20, 21)

--3776-1, 2: #9752 and #5700 or #5702 (14) <)

## FACILITY D6

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex (Except Canada > nonswitched voice grade line <) (Canada, only > Schedule 4, Type 4 Data Channel (or equivalent) <) via a 3864 mdl 1 Modem or a 3868 mdl 2 Rack-Mounted Modem (Except Canada > or a 3874 Modem or a PTT-mandatory modem complying with CCITT Recommendations V.24, V.27 or V.27bis and V.28 and ISO Standard 2110. <) (Canada only) > or, on a duplex Schedule 4, Type 4A, Data Channel (or equivalent), via a 3874 Modem. <) (1, 23)

--(Canada only > 2701: #7698 (8) <)

--(Except Canada > 2701: #2899 (8) <) (Japan only > (#2970 is required in place of #2899) <)

--3138: #4640, #9609 and #9649 (3)

--(Except Japan > 3232-1: (6) <)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)

--3274-51C: #3701 and #6302 or #6303 (14)

--(Japan only > 3274-52C: #3701 and #6302 or #6303 (14) <)

--3276-1, 4: #3701, #6302 and #9491

--3276-11, 14: #3701, #6302 and #9491 (14)

--3602: #3701 and #4502 or #6302 (14)

--3624: #3701 and #1422 or #6302 (14)

--3631, 3632: #3701 and #4502 or #6302 (14)

--(Canada only > 3651-25, 50: #9124 or #9125 (14)

--3651-75: #9124 or #9125 (14) <)

--(Except Canada > 3651-25, 50: #2827 or #2828 and #2846 or #2954 (14)

--3651-75: #2827 or #2828 and #2846 or #2954 (14) <)

--3684: #3701 and #9823

--(Canada only > 3694: #3701 and #4502 (14) <)

--(Japan only > 3694: #3701 and #4502 (14) <)

--3704, 3705-II: #4714 or #4718 (14, 16, 17)

--3705-80: No special feature required

--3708: No special feature required

--3710: #7001

--3725-1, 2, 3726: #4911 (14, 33, 34)

--3771, 3774, 3775: #1481 and #3701 (14)

--3776-1, 2, 3777-1, 2: #1481 and #3701 (14)

--3776-3, 4, 3777-3, 4: #3701 (14, 15)

--3791: #3701 and #6302 or #6303 (14) or #3211 and #3703 (9)

--3843: (6, 10)

--3845, 3846: (6, 16)

--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)

--4701-1, 2, 3: (14, 31)

--4702: (14, 31)

--4730: (6, 13, 14)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310

--4975-2R: (7)

--4987: #4730 or #4731 (14)

--5110: #2074 and #3701

--(Canada only > 5150: (6, 13) <)

--5231: #4780, #9754 and #9481 or #9482

--5251-2, 12: #3701

--5265: #3701

--5285, 5288: #3701 (14)

--5294-1: #3701

--(Except Canada > 5294-K01: #3701 <)

--5340: #2500 and #3701 (11, 14)

--5360: #3701 or #4552 (14)

--5362: #2920 (14)

--5364: (14, 37)

--5381: #3701 (14)

--5525: #3701 or #3702

--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)

--7426: (6)

--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)

--8130 B: #3701 and #1602 or #1604 (14)

--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623

--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)

--8550, 8580, 8580: #3042 (P/N 6450348) (40)

--8775: #3701 and #9494

--8815-1: #3701 (14, 32)

--9373, 9375, 9377: #6030, #6031

## (CANADA AND JAPAN ONLY > FACILITY D6M

Point-to-point or multipoint synchronous operation at 4800 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--2701: #7698 (8)

--3138: #4640, #9609 and #9649 (3)

## MACHINES

--3232-1: (6)  
--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)  
--3274-51C: #3701 and #6302 or #6303 (14)  
--3276-1, 4: #3701, #6302 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (14)  
--3602: #3701 and #4502 or #6302 (14)  
--3624: #3701 and #1422 or #6302 (14)  
--3631, 3632: #3701 and #4502 or #6302 (14)  
--3651-25, 50: #9124 or #9125 (14)  
--3651-75: #9124 or #9125 (14)  
--3684: #3701 and #9823  
--3694: #3701 and #4502 (14)  
--3704, 3705-II: #4714 or #4718 (14, 16, 17)  
--3705-80: No special feature required  
--3708: No special feature required  
--3710: #7001  
--3725-1, 2, 3726: #4911 (14, 33, 34)  
--3771, 3774, 3775: #1481 and #3701 (14)  
--3776-1, 2, 3777-1, 2: #1481 and #3701 (14)  
--3776-3, 4, 3777-3, 4: #3701 (14, 15)  
--3791: #3701 and #6302 or #6303 (14) or #3211 and #3703 (9)  
--3843: (6, 10)  
--3845, 3846: (6, 16) <  
--(Canada and Japan only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2: (14, 31)  
--4730: (6, 13, 14)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310  
--4975-2R: (7)  
--4987: #4730 or #4731 (14)  
--5110: #2074 and #3701  
--5150: (6, 13)  
--5231: #4780, #9754 and #9481 or #9482  
--5251-2, 12: #3701  
--5265: #3701  
--5285, 5288: #3701 (14)  
--5294-1: #3701 <  
--(Japan only > 5294-K01: #3701 <  
--(Canada and Japan only > 5340: #2500 and #3701 (11, 14)

--5360: #3701 or #4552 (14)  
--5362: #2920 (14)  
--5364: (14, 37)  
--5381: #3701 (14)  
--5525: #3701 or #3702  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--7426: (6)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1606 (13)  
--8130 B: #3701 and #1602 < (Canada only > or #1604 < (Canada only > (14)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)  
--8550, 8560, 8580: #3042 (P/N 6450348) (40)  
--8775: #3701 and #9494  
--8815-1: #3701 (14, 32)  
--9373, 9375, 9377: #6030, #6031 <

## FACILITY D6SB

Point-to-point or multipoint synchronous operation at 4800 bps on a duplex (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) with backup on the public switched telephone network via a 3864 model 1 Modem equipped with #7953 (Canada only > or, on a Schedule 4, Type 4A Data Channel (or equivalent) <) (Canada only > via a 3874 Modem equipped with #7951 or #7952. <) (1, 20, 23)

--(Canada only > 2701: #7698 (8) <  
--(Except Canada > 2701: #2899 (8) <) (Japan only > (#2970 is required in place of #2899) <  
--3138: #4640, #9609 and #9649 (3)  
--(Except Japan > 3232-1: (6) <  
--3274-1C, 21C 31C: #3701 and #6302 or #6303 (14)  
--3274-51C: #3701 and #6302 or #6303 (14)  
--3276-1, 4: #3701, #6302 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (14)  
--3602: #3701 and #4502 or #6302 (14)  
--3631, 3632: #3701 and #4502 or #6302 (14)  
--(Canada only > 3651-25, 50: #9124 or #9125 (14)  
--3651-75: #9124 or #9125 (14) <  
--(Except Canada > 3651-25, 50: #2954 and #2827, #2828 or #2846 (14)  
--3651-75: #2954 and #2827, #2828 or #2846 (14) <  
--3684: #3701 and #9823 (14)  
--(Canada only > 3694: #3701 and #4502 (14) <

## MACHINES

--(Japan only > 3694: #3701 and #4502 (14) <)

--3704, 3705-II: #4714 (14, 16, 17)

--3705-80: No special feature required

--3708: No special feature required

--3710: #7001

--3725-1, 2, 3726: #4911 (14, 33, 34)

--3771, 3774, 3775: #1481 and #3701 (14)

--3776-1, 2 3777-1, 2: #1481 and #3701 (14)

--3776-3, 4, 3777-3, 4: #3701 (14)

--3791: #3701 and #6302 or #6303 and/or #3211 and #3703 (14)

--3843: (6, 10)

--3845, 3846: (6, 16)

--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)

--4701-1, 2, 3: (14, 31)

--4702: (14, 31)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310

--4987: #4730 or #4731 (14)

--5110: #2074 and #3701

--(Canada only > 5150: (6, 13) <)

--5251-2, 12: #3701 and #9492

--5265: #3701

--5285, 5288: #3701 (14)

--5294-1: #3701 (36)

--(Except Canada > 5294-K01: #3701 (36) <)

--5340: #2500 and #3701 (11, 14)

--5360: #3701 or #4552 (14)

--5362: #2920 (14)

--5364: (14, 37)

--5381: #3701 (14)

--5525: #3701 or #3702

--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)

--7426: (6)

--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)

--8130 B: #3701 and #1602 or #1604 (14)

--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623

--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)

--8550, 8560, 8580: #3042 (P/N 6450348) (40)

--8775: #3701 and #9494

--8815-1: #3701 (14, 32)

--9373, 9375, 9377: #6030, #6031

## FACILITY D7M

Point-to-point or multipoint synchronous operation at 7200 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--(Canada only > 2701: #7698 (8) <)

--(Except Canada > 2701: #2899 (8) <) (Japan only > (#2970 is required in place of #2899) <)

--3138: #4640, #9609 and #9649 (3)

--(Except Japan > 3232-1: (6) <)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)

--3276-1, 4: #3701, #6302 and #9491

--3276-11, 14: #3701, #6302 and #9491 (14)

--3602: #3701 and #4502 (14)

--3631, 3632: #3701 and #4502 (14)

--(Canada only > 3694: #3701 and #4502 (14) <)

--3704, 3705-II: #4714 or #4718 (14, 16, 17)

--3705-80: No special feature required

--3708: No special feature required

--3710: #7001

--3776-3, 4, 3777-3, 4: #3701 (14, 17)

--3777-1, 2: #1481 and #3701 (14)

--3791: #3701 and #6303 (14) or #3211 and #3703 (9)

--3812: #3060

--3845, 3846: (6, 16)

--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)

--4701-1, 2, 3, 4702: (14, 31)

--4730, 4736: (6, 13, 14)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310

--4987: #4730 or #4731 (14)

--(Canada only > 5150: (6, 13) <)

--5251-2, 12: #3701

--5294-1: #3701

--(Except Canada > 5294-K01: #3701 <)

--5340: #3701 (11, 14)

--5360: #3701 or #4552 (14)

--5362: #2920 (14)

## MACHINES

--5364: (14, 37, 38)  
--5381: #3701 (14)  
--5525: #3701 or #3702  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--7426: (6)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)  
--8130 B: #3701 and #1602 or #1604 (14)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)  
--8550, 8560, 8580: #3042 (P/N 6450348) (40)  
--8775: #3701 and #9494  
--8815-1: #3701 (14, 32)

## FACILITY DA8

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via an integrated modem. (1)

--3274-31C: #5840 or #5842, #9112 and #6302 or #6303 (14)

## FACILITY D8

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex 4-wire channel (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) via a 3865 modem, a 5865 modem, a 5868-051 rack-mounted modem, a 3868-003 or -004 rack-mounted modem or a 5866-001 operating in 5865 mode (Except Canada > or via a PTT mandatory modem complying with CCITT Recommendations V.24, V.28 V.29, or V.32 and ISO Standard 2110. <) (Except Canada > (1, 2) <)

--(Except Japan > 3232-1: (6) <)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)

--3274-51C: #3701 and #6302 or #6303 (14)

--3276-1, 4: #3701, #6302, #6315 and #9491

--3276-11, 14: #3701, #6302 and #9491 (14)

--3602: #3701 and #4502 (14)

--3631, 3632: #3701 and #4502 (14)

--(Canada only > 3694: #3701 and #4502 or #6302 (14) <)

--(Japan only > 3694: #3701 and #4502 (14) <)

--3704, 3705-II: #4714 or #4718 (14, 16, 17)

--3705-80: No special feature required

--3708: No special feature required

--3710: #7001

--3725-1, 2, 3726: #4911 (14, 33, 34)

--3776-3, 4, 3777-3, 4: #3701 (14, 15)  
--3777-1, 2: #1481 and #3701 (14)  
--3791: #3701 and #6303 (14) or #3211 and #3703 (9)  
--3812: #3060  
--3843: (6, 10)  
--3845, 3846: (6, 16)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2: (14, 31)  
--4730, 4736: (6, 13, 14)  
--4952, 4955, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310  
--4987: #4730 or #4731 (14)  
--(Canada only > 5150: (6, 13) <)  
--5251-2, 12: #3701  
--5294-1: #3701  
--(Except Canada > 5294-K01: #3701 <)  
--5340: #2500 and #3701 (11, 14)  
--5360: #3701 or #4552 (14)  
--5362: #2920 (14)  
--5364: (14, 37, 38)  
--5381: #3701 (14)  
--5525: #3701 or #3702  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--7426: (6)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)  
--8130 B: #3701 and #1602(Canada only > or #1604 <) (14)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)  
--8550, 8560, 8580: #3042 (P/N 6450348) (40)  
--8775: #3701 and #9494  
--8815-1: #3701 (14)  
--9373, 9375, 9377: #6030, #6031

## (CANADA ONLY > FACILITY D8M

Point-to-point or multipoint synchronous operation at 9600 bps on a nonswitched line via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--3232-1: (6)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)

--3274-51C: #3701 and #6302 or #6303 (14)

## MACHINES

--3276-1, 4: #3701, #6302, #6315 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (14)  
--3602: #3701 and #4502 (14)  
--3631, 3632: #3701 and #4502 (14)  
--3694: #3701 and #4502 (14)  
--3704, 3705-II: #4714 or #4718 (14, 16, 17)  
--3705-80: No special feature required  
--3708: No special feature required  
--3710: #7001  
--3725-1, 2, 3726: #4911 (14, 33, 34)  
--3776-3, 4, 3777-3, 4: #3701 (14, 15)  
--3777-1, 2: #1481 and #3701 (14)  
--3791: #3701 and #6303 (14) or #3211 and #3703 (9)  
--3812: #3060  
--3843: (6, 10)  
--3845, 3846: (6, 16) <  
--(Canada only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2: (14, 31)  
--4730, 4736: (6, 13, 14)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310  
--4987: #4730 or #4731 (14)  
--5150: (6, 13)  
--5251-2, 12: #3701  
--5294-1: #3701  
--5340: #2500 and #3701 (11, 14)  
--5360: #3701 or #4552 (14)  
--5362: #2920 (14)  
--5364: (14, 37, 38)  
--5381: #3701 (14)  
--5525: #3701 or #3702  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--7426: (6)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)  
--8130 B: #3701 and #1602 < (Canada only > or #1604 < (Canada only > (14)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)

--8550, 8560, 8580: #3042 (P/N 6450348) (40)  
--8775: #3701 and #9494  
--8815-1: #3701 (14)  
--9373, 9375, 9377: #6030, #6031 <

## FACILITY D8SB

Point-to-point or multipoint synchronous operation at 9600 bps on a duplex (Except Canada > nonswitched voice grade line <) (Canada only > Schedule 4, Type 4 Data Channel (or equivalent) <) with backup on the public switched telephone network via a 3865 Modem equipped with #7953. (1)

--(Except Japan > 3232-1: (6) <  
--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (14)  
--3274-51C: #3701 and #6302 or #6303 (14)  
--3276-1, 4: #3701, #6302, #6315 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (14)  
--3602: #3701 and #4502 (14)  
--3631, 3632: #3701 and #4502 (14)  
--(Canada only > 3694: #3701 and #4502 (14) <  
--(Japan only > 3694: #3701 and #4502 (14) <  
--3704, 3705-II: #4714 or #4718 (14, 16, 17)  
--3705-80: No special feature required  
--3708: No special feature required  
--3710: #7001  
--3725-1, 2, 3726: #4911 (14, 33, 34)  
--3776-3, 4, 3777-3, 4: #3701 (14, 15)  
--3777-1, 2: #1481 and #3701 (14)  
--3791: #3701 and #6303 (14) or #3211 and #3703 (9)  
--3812: #3060  
--3843: (6, 10)  
--3845, 3846: (6, 16)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (4)  
--4701-1, 2, 3: (14, 31)  
--4702: (14, 31)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (14) or #1310  
--4987: #4730 or #4731 (14)  
--(Canada only > 5150: (6, 13) <  
--5251-2, 12: #3701 and #9492  
--5294-1: #3701 (36)  
--(Except Canada > 5294-K01: #3701 (36) <  
--5340: #2500 and #3701 (11, 14)

- 5360: #3701 or #4552 (14)
- 5362: #2920 (14)
- 5364: (14, 37, 38)
- 5381: #3701 (14)
- 5525: #3701 or #3702
- 6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)
- 7426: (6)
- 8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (14) or #3701 and #1605 (13)
- 8130 B: #3701 and #1602 or #1604 (14)
- 8140 C: #1610, #1611, #1620, #1621 or #1630 (14) or #1622 (14) or #1623
- 8150: #1732, #1733, #1734, #1735, #1763 or #1764 (14)
- 8550, 8560, 8580: #3042 (P/N 6450348) (40)
- 8775: #3701 and #9494
- 8815-1: #3701 (14)
- 9373, 9375, 9377: #6030, #6031

### FACILITY D9

Point-to-point or multipoint synchronous operation at 14,400 bps on a 4-wire channel (Except Canada>nonswitched grade line<) (Canada only>Schedule 4, Type 4 data channel (or equivalent)<) via a 5866-001 modem or a 5868-061 rack-mounted modem (Except Canada> or via a PTT mandatory modem complying with CCITT Recommendations V.24, V.28, V.33 and ISO Standard 2110.<)

- 9373, 9375, 9377: #6030, #6031

### (CANADA AND JAPAN ONLY> FACILITY D9M

Point-to-point or multipoint synchronous operation at 14,400 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiplier Systems Policy. (1)

- 5294-1, K01, 5362: #3701
- 8550, 8560, 8580: #3042 (P/N 6450348) (40)
- 9373, 9375, 9377: #6030, #6031

### FACILITY D10M

Point-to-point or multipoint synchronous operation at speeds of greater than 14,400 bps up to and including 20,000 bps on a nonswitched line via a standalone DCE attached under the provisions of the IBM Multiple Supplier System Policy. (1)

- 5294-1, K01, 5362: #3701
- 9373, 9375, 9377: #6030, #6031<)
- Notes for Chart D:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. Integrated modems perform the modulation/demodulation function on a communication facility at speeds up to 4800 bps.

When they are used, stand-alone DCEs are not required. GA24-3435 provides descriptions of these modems and definitions of the communication facilities on which they may be used.

(Except Canada> As these integrated modems do not necessarily conform to the CCITT Recommendations, refer to the GI Section and to the appropriate machine pages for special applications, prerequisites and the required procedures for meeting the PTT's regulations is advised.<)

3. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
  4. Specify codes #967X, #968X and #969X stipulate in which protocol the 4331 or 4361 is to communicate, and to which line position this protocol will be assigned, with the "X" in each case denoting the line position. See M4331 or 4361 pages for details. Note: On the 4361, specify codes #967X and #969X are not required.
  5. The 3603 model 1 and the 3624, when equipped with #8001, will communicate with a 3602 over a normal "3600 System Loop". When more than one 3603 and/or 3624 are on the loop, point-to-point, half-duplex, 2-wire terminated links are required from the 3602 to the first station on the loop, between successive stations on the loop, and from the last station on the loop back to the 3602. When there is only one 3603 or 3624 on the loop, a point-to-point, duplex, 4-wire terminated link is required between that station and the 3602.
- The 3602 and 3624, when equipped with either #3701 or #5500, will communicate over a nonswitched voice grade line with a 3704, 3705, 3725-1, 2, or 3726 in either point-to-point or multipoint mode.
6. No special feature is required to attach this DTE to this facility.
  7. The 3602 and 3624 will operate on this facility at 1200 bps only. The operational speed of the other DTEs on the facility is determined by:

- A customer-accessible switch on the 2701, 3138, 3274, 3276, 3624, 3631, 3632, 3651, 3741, 3771, 3774, 3775, 5110, 5251, 5265, 5340, and 5381.
- The installation of a speed specify on the 3704, 3705, 8101, 8130, 8140 and 8775. (Please note that, in Emulation mode, the reassignment of a line on the 3704 or 3705 to a different speed will require the re-IPL of the 3704/3705. In NCP mode, this reassignment can be accomplished through a customer-initiated message to the access method.)
- A customer-accessible switch on the 3767 when #2834 is installed, otherwise, through the installation of a speed specify.
- A customer-initiated keyboard request on the 3791, 4331 or 4361.
- A customer-initiated console request on the 4952, 4955, 4959, 4987 and 5231.
- An Operator Control Language (OCL) instruction on the 6670.
- The options chosen at the generation of the control program of the 3725-1, 2. (Please note that in Emulation mode, the reassignment of a line on the 3725-1, 2, 3726 to a different speed will require the re-IPL of the 3725-1, 2. In NCP mode, this reassignment can be accomplished through a customer-initiated message to the access method.)

8. The listed feature code is for the attachment of a single synchronous communication line to the 2701. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second synchronous line may be attached.
9. The 3276 may be attached as a tributary station on a multipoint nonswitched line where the control station is a 3791 equipped with the Data Link Adapter #3210 or #3211. All stations on such a link must operate at the same line speed and use the

- same clocking source, i.e., either DTE clock or modem clock, but not a mixture of these two.
10. The 3631, 3632, 8101, 8130 and 8140 support communication with down line 3843 Loop Control Units. The 3843 provides an EIA/CCITT interface to a stand-alone DCE and can be utilized with any synchronous modem at a speed of 2400, 4800 or 9600 bps.
  11. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
  12. These feature codes are for the attachment of a modem which does NOT provide its own clocking. (Except Canada > The 3976 model 3 Modem is such a modem, and, therefore, requires these feature codes. <) This class of modem should always be used where the network is international.
  13. These feature codes are for the attachment of a modem which DOES provide its own clocking. This class of modem should only be used on an intranational network.
  14. The 3274 models 1C and 51C, 3276 models 11 through 14, 3602, 3624, 3631, 3632, 3651, 3684, 3694, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4702, 4730, 4736, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 6670, 8101, 8130, 8140, 8150 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704 or 3705 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities and a 3704, 3705, 3725-1, 2, or 3726 equipped with:
    - #4784 for communication with tributary stations with 1200 bps integrated modems.
    - #4755 for communication with tributary stations with 2400 bps integrated modems (#5602) or attaching 3872 Modems.
    - #4718 for communication with tributary stations via stand-alone DCEs.
 or a 3725-1, 2, 3726 equipped with:
    - #4911 for communication with tributary stations via stand-alone DCEs.
  15. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 model 3, 3776 model 4 or 3777 model 3. This type communication requires full-duplex communication facilities.
  16. The 3845 and 3846 are data encryption/decryption devices, installed between the DTE and the DCE. They will operate at speeds of up to 1200 bps with start/stop DTEs, and at speeds of up to 19.2K bps with synchronous DTEs. The DCEs involved must meet the requirements of (Canada only > EIA RS-232-C. <) (Except Canada > CCITT Recommendations V.24 and V.28. <)
  17. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714, #4751 and #4781 will support the normal data-half-duplex mode of operation on half-duplex or duplex communication facilities. #4718, #4754 and #4784 will support a data-full-duplex operation (i.e., simultaneous data transmission in both directions) on duplex communication facilities.
  18. There are two types of 2400 bps integrated modems that are NOT compatible with each other. The first type, #4751, #4752, #4754, #4755, #5600 and #5602 are line compatible and suitable for communication with each other and with a properly equipped 3872 Modem. The second type, #5640, is line compatible and suitable for communication with another #5640 or with a 3863 model 1 Modem or with a 3868 mdl 1 Rack-Mounted Modem.
  19. CCITT V.23 modems that provide modem clocking and CCITT V.26 modems that use Alternative B coding are not truly data transparent, in that transmission of a long string of zeros can cause the receiving modem to lose synchronization. Therefore, unless the PTT can assure that the modems will not lose synchronization during the transmission of zeros for up to one second, NRZI encoding should be used in SDLC (when the 3845 or 3846 are NOT to be installed), and transparent mode should NOT be used in BSC. See your PTT coordinator for details.
  20. On switched network backup facilities, the IBM stand-alone or integrated modem must be equipped as shown for operation on the backup link. However, a control station may elect to operate on this type service via two separate ports, one of which is dedicated to the primary nonswitched link, and the other of which is dedicated to the backup switched link. Each of these ports must be equipped with a modem compatible with the stand-alone or integrated modem with which it is to communicate.
  21. There are two types of 4800 bps integrated modems that are NOT compatible with each other. The first type, #5700 and #5702, is line compatible and suitable for communication with each other and with a properly equipped 3874 Modem. The second type, #5740, is line compatible and suitable for communication with another #5740 and with a 3864 model 1 Modem or 3868 model 2 Rack-Mounted Modem.
  22. The 3651 will communicate over this facility with a 3704, 3705, 3725-1, 2 or 3726 at the host system, or with a 3659 at a remote store site. See the M3651 pages for the appropriate feature codes for both type communications. See the M3659 pages for the requirements on that unit for the remote store communications.
  23. Refer to the M3863, 3864 and 3865 pages for the DTE attachment codes required for each attaching DTE.
  24. (Except Canada > The IBM 1200 bps integrated modem is line compatible and suitable for communication with a 3976 model 3 Modem. <) (Canada only > Ignore this note. <)
  25. (Except Canada > The 3977 model 2 Modem is in an "As Available" ordering status. <) (Canada only > Ignore this note. <)
  26. Ignore this note.
  27. The 8101 can only be attached to an 8140.
  28. Ignore this note.
  29. Ignore this note.
  30. Ignore this note.
  31. For communication in the SNA/SDLC protocol, no special feature is required on the 4701 or 4702. For communication in the BSC protocol, "which is limited to a speed of no greater than 4800 bps", #1422 is required. Communication in either protocol requires that clocking be provided by the attached DCE. (Except Canada > (The 4701 or 4702 do not, therefore, support the attachment of the 3976 model 3 Modem.) <)
  32. The 8815 mdl 4 provides a 4800-bps integrated modem as part of the basic machine. This modem is line compatible and suitable for communication with another 8815-4 or with a 8815-1 equipped with a 3864 mdl 1.
  33. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex communication facilities or a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication facilities.
  34. The 3725-1, 2, 3726 equipped with #4911 can communicate in a data full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 mdl 3 or 4, or a 3777 mdl

**MACHINES**

- |                                                                                                                                                                                                                                             |                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3. This type of communication requires full-duplex communication facilities.                                                                                                                                                                | 38. For the 5364, not for use with Binary Synchronous Communications when the directly-attached IBM Personal Computer is a 5150 (Personal Computer) or a 5160 (Personal Computer XT). |
| 35. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.                                                                                                                                                          |                                                                                                                                                                                       |
| 36. The 5294 supports operation on this facility only when the attached modem is not dependent on a DTE signal (select-standby) for selection of switched network backup mode; that is, SNBU must be selectable by a modem operator switch. | 39. Requires Mainframe Communication Assistant Program (Canada Only > (P/N 6024452) point-to-point only <) (Except Canada > (P/N 67X6480) <)                                          |
| 37. The 5364 uses IBM Personal Computer communications facilities.                                                                                                                                                                          | 40. Requires either PC 3270 Emulation Program (P/N 59X9969) or Advanced Program to Program Communications Program (P/N 75X1047)                                                       |

## 2700 CHART E - NONSWITCHED WIDEBAND CHANNELS

### CHART E - NONSWITCHED WIDEBAND CHANNELS

For each machine type, the special features required for attachment are shown.

#### FACILITY E1

Point-to-point synchronous operation at (Canada only > 19.2K bps on a Type 8803 Service <) (Except Canada > 20.4 or 24K bps via a 5979-L21 Modem <) (1)

(Canada only > 2701: #7697 (4))

3704: #4717

3705-II: #4717 or #4725 (2, 3)

3705-80: #6713

3708: No special features required. <)

3710: #7001 or #7005

(Canada only > 3725-1, 2, 3726: #4921 (8, 9))

3776-3, 4, 3777-3 4: #4501 (3)

3777-1, 2: #1481 and #4501

4952, 4954, 4955, 4956, 4959, 4965: #2075

5340: #5401 or #5402 or #5403 or #5404 <)

(Except Canada > 3274-1C, 21C, 31C: #1550 and #6303)

3704: #2944 or #4717 (2)

3705-II: #2944 or #4717 or #4725 or #4726 (2, 3)

3705-80: #6712 or #6713

3725-1, 2, 3726: #4921 or #4931 (8, 9)

3776-3, 4, 3777-3, 4: #2911 or #4501 (3) (at 20.4K bps only)

3777-1, 2: #1481 and #2911 or #4501 (at 20.4K bps only)

4331: #1601, #4695, #4720 and #967X or #969X (4)

4952, 4954, 4955, 4956, 4959, 4965: #2075

5360: #5401 or #4556

8101, 8130 B, 8140 A, B: #1550 and #1602 (6)

8140 C: #1614

8150: #1742 or #1745 <)

I 9373, 9375, 9377: #6030, #6031

#### FACILITY E2

Point-to-point synchronous operation at (Canada only > 40.8K bps on a Type 8801 Service (1) <) (Except Canada > 48K bps via a 5979-L21B Modem or a PTT-mandatory modem complying with CCITT Recommendation V.35 and ISO Standard 2593 (1, 7) <)

(Canada only > 2701: #7697 (4) <)

(Except Canada > 3274-1C, 21C, 31C: #1550 and #6303 <)

3704: #4717 (Canada only > (2) <) (Except Canada > or #2944 (2, 5) <)

3705-II: #4717 or #4725 (Canada only > (2) <) (Except Canada > or #2944 or #4726 (2, 5) <)

(Canada only > 3705-80: #6713 <)

(Except Canada > 3705-80: #6712 or #6713 <)

3710: #7005

(Except Canada > 3725-1, 2, 3726: #4921 (8, 9) <)

(Except Canada > 4331, 4361: #1601, #4695, #4720 and #967X or #969X (4) <)

4952, 4954, 4955, 4956, 4959, 4965: #2075

(Canada only > 5340: #5401 or #5402 or #5403 or #5404 <)

(Except Canada > 5360: #5401 or #4556)

5362: #2930

8101, 8130 B, 8140 A, B: #1550 (6)

8140 C: #1614

8150: #1742 or #1745 <)

I 9373, 9375, 9377: #6030, #6031

#### FACILITY E3

Point-to-point synchronous operation at (Canada only > 50K bps on a Type 8801 Service <) (Except Canada > 56K or 64K bps via a 5979-L21 Modem <) (1)

(Canada only > 2701: #7697 (4))

3704: #4717 (2)

3705-II: #4717 or #4725 (2)

3705-80 <)

3710: #7005

(Canada only > 3725-1, 2, 3726: #4921 (8, 9))

4952, 4954, 4955, 4956, 4959, 4965: #2075

5340: #5401 or #5402 or #5403 or #5404 <)

(Except Canada > 3274-1C, 21C, 31C: #1550 and #6303 (at 56K bps only))

3704: #2944 or #4717 (2)

3705-II: #2944 or #4717 or #4725 or #4726 (2)

3705-80: #6712 or #6713

3725-1, 2, 3726: #4921 or #4931 (8) <)

(Except Canada > 4331, 4361: #1601, #4695, #4720 and #967X or #969X (5))

4952, 4954, 4955, 4956, 4959, 4965: #2075

**5360:** #5401 or #4556

**5362:** #2930

**8101, 8130 B, 8140 A, B:** #1550 and #1602 (6)

**8140 C:** #1614

**8150:** #1742 or #1745 (<)

**9373, 9375, 9377:** #6030, #6031

**(CANADA ONLY > FACILITY E4)**

Point-to-point synchronous operation at 230.4K bps on a Type 8751 Service (1)

**2701:** #7697 (4)

**3705-II:** #4722 or #4723 (2)

**3725-1, 2, 3726:** #4921 (8) (<)

**Notes for Chart E:**

1. Contact IBM for more information on attachable DCEs, services, etc.
2. 3704/3705 "Remotes" may communicate over this facility with 3704/3705 "Locals" as their primary communication link. (Canada only > #4717 and #4722 (<)) (Except Canada > #2944 and #4717 (<)) will support the normal data-half-duplex operational mode, while #4725 (Except Canada > or #4726 (<)) will support a data-full-duplex (i.e., simultaneous data transmission in both directions) operational mode.
3. The 3705, using (Canada only > #4725 (<)) (Except Canada > #4725 or #4726 (<)) can communicate in a data-full-duplex mode (i.e., data transmission in both di-

rections simultaneously) with a 3776 Model 3, 3776 Model 4 or a 3777 Model 3.

4. (Canada only > This feature code is for the attachment of a single communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached. (<)) (Except Canada > Specify codes #967X and #969X on the 4331 or 4361 stipulate in which protocol the 4331 or 4361 is to communicate, and to which line position on the 4331 or 4361 that protocol is to be assigned, with the "X" in each case being the line position. See the M4331 or 4361 pages for details. Note: On the 4361, specify codes #967X and #969X are not required. (<))
5. (Canada only > A communication line attached to the ICA via this feature presents a 100% load factor to the ICA, and must not be operated simultaneously with any other line on the ICA. (<)) (Except Canada > This DTE supports attachment to the 5879-L21 Modem only. (<))
6. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or with an 8140 C without #1610-#1614 or with an 8150 without ports 1-4 and 9-12.
7. IBM DTEs normally provide cables terminating with #16 pins. In those countries where #20 pins are required, an adapter cable is available. This is supplied as Cable Group #1393 on the 3704 and 3705, and as specify #2723 on the 4952, 4955, 4959, 4987, 8101 and 8140.
8. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. (Canada only > #4921 (<)) (Except Canada > #4931 (<)) will support the normal data half-duplex operational mode and a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode.
9. The 3725-1, 2, 3726 using (Canada only > #4921 (<)) (Except Canada > #4931 (<)) can communicate in a data full-duplex mode (i.e., data transmission in both directions simultaneously) with a 3776 mdl 3 or 4, or a 3777 mdl 3.

## 2700 CHART G - NONSWITCHED BASEBAND LINES

### CHART G - NONSWITCHED BASEBAND LINES

For each machine type, the special features required for attachment are shown.

#### FACILITY G1

Point-to-point or multipoint start/stop operation at 134.5 bps via an integrated Type 1A (half-duplex) or Type 1B (duplex) limited distance line adapter.(1)

3704, 3705-II: #9606 and #4731 (Type 1A) or #4732 (Type 1B)

#### FACILITY G2

Point-to-point or multipoint start/stop operation at 134.5 or 600 bps via an integrated Type 2A (half-duplex) or Type 2B (duplex) limited distance line adapter (1)

2701: #4636 (Type 2A) or #4637 (Type 2B)

3704, 3705-II: #4741 and #9606 (at 134.5 bps) or #9607 (at 600 bps)

#### (EXCEPT CANADA > FACILITY G3

Point-to-point or multipoint synchronous operation at 2400, 4800 or 9600 bps via a 5979-L41 Modem or a PTT-mandatory modem complying with CCITT Recommendations V.24 and V.28 and ISO Standard 2110. (2) < )

(Except Canada > 2701: #2899 (3)

3138: #4640, #9609 and #9649 (3, 4) < )

(Except Canada > 3232-1: (5) < )

(Except Canada > 3274-1C, 21C, 31C: #3701 and #6302 or #6303 (6)

3274-51C: #3701 and #6302 or #6303 (6)

3276-1, 4: #3701, #6302 and #9491 (3)

3276-11, 14: #3701, #6302 and #9491 (6)

3602: #3701 and #6302 (3, 6) or #3701 and #4502 (6)

3603-2: 2400 bps, point-to-point only (5) < )

(Except Canada > 3624: #3701 and #1422 or #6302 (3, 6) < )

(Except Canada > 3631, 3632: #3701 and #4502 or #6302

3651-25, 50: #2897 and #2825 or #2826 (6, 7) or #2846 and #2727 or #2728 (6, 8)

3651-75: #2897 and #2825 or #2826 (6, 7) or #2846 and #2727 or #2728 and/or #2725 and #6185 (7)

3684: #3701 and #9822 (6, 7) or #3701 and #9823 (6, 8) < )

(Except Canada > 3694: #3701 or #3701 and #4502 (6) < )

(Except Canada > 3704, 3705-II: #4714 or #4718 (6, 9, 10)

3705-80: No special feature required

3708: No special features required. < )

3710: (Except Canada > #7001 < )

(Except Canada > 3725-1, 2: #4911 (6, 17, 18)

3726

3741: #9121 (7)

3771, 3774, 3775: #1481 and #3701 (3, 6)

3776-1, 2: #1481 and #3701 (3, 6)

3776-3, 4, 3777-3, 4: #3701 (6)

3777-1, 2: #1481 and #3701 (6)

3791: #3701 and #6302 or #6303 (6) or #3211 and #3703 (11) < )

(Except Canada > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (12)

4701-1, 2, 3, 4702: (6, 16) < )

(Except Canada > 4730: (5, 6) < )

(Except Canada > 4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (6) or #1310

4987: #4730 or #4731 (6)

5110: #2074 and #3701 (3) < )

(Except Canada > 5231: #4780, #9753 or #9754 and #9481 or #9482 (3)

5251-2, 12: #3701

5265: #3701 (7)

5285, 5288: #3701 (3, 6)

5294-1: #3701 < )

(Except Canada > 5294-K01: #3701 < )

(Except Canada > 5340: #2500 and #3701 (6, 13)

5360: #3701 or #4552 (6)

5362: #2920 (6)

5364: (6, 19)

5381: #3701 (6)

5525: #3701 or #3702

6360: #3704 or #3705 or #3707 (7) (point-to-point only)

6580: #3705 (point-to-point only)

6670: #3701 (6, 7)

7426: (5)

8101, 8130 A: #3701 and #1602 or #1604 (6) or #3701 and #1605

8130 B: #3701 and #1602 < ) (Except Canada > or #1604 < ) (Except Canada > (6)

8140 A, B: #3701 and #1602 or #1604 (6) or #3701 and #1605

8140 C: #1610, #1611, #1620, #1621, #1622, #1623, or #1630 (6)

**MACHINES****8150:** #1732, #1733, #1734, #1735, #1763, or #1764 (6)**8775:** #3701 and #9494**8815-1:** #3701 (6)| **9373, 9375, 9377:** #6030, #6031 (<)**(CANADA AND JAPAN ONLY > FACILITY G3M**

Point-to-point or multipoint synchronous operation at 2400, 4800 or 9600 bps via a stand-alone baseband modem attached under the provisions of the IBM Multiple Supplier Systems Policy.(2)

**2701:** #7698 (3)**3138:** #4640, #9609 and #9649 (3, 4)**3232-1:** (5)**3274-1C, 21C, 31C:** #3701 and #6302 or #6303 (6)**3274-51C:** #3701 and #6302 or #6303 (6)**3276-1, 4:** #3701, #6302 and #9491 (3)**3276-11, 14:** #3701, #6302 and #9491 (6)**3602:** #3701 and #4502 or #6302**3603-2:** 2400 bps, point-to-point only (5)**3624:** #3701 and #1422 or #6302 (3, 6)**3631, 3632:** #3701 and #4502 or #6302**3651-25, 50:** #9121 or #9122 (6, 7) or #9124 or #9125 (6, 8)**3651-75:** #9121 or #9122 (6, 7) or #9124 or #9125 (6, 8) or #6185 (7)**3684:** #3701 and #9822 (6, 7) or #3701 and #9823 (6, 8)**3694:** #3701 or #3701 and #4502 (6)**3704, 3705-II:** #4714 or #4718 (6, 9, 10)**3705-80:** No special feature required**3708:** No special features required.**3710:** #7001**3725-1, 2, 3726:** #4911 (6, 17, 18)**3741:** #9121 (7)**3771, 3774, 3775:** #1481 and #3701 (3, 6)**3776-1, 2:** #1481 and #3701 (3, 6)**3776-3, 4, 3777-3, 4:** #3701 (6)**3777-1, 2:** #1481 and #3701 (6)**3791:** #3701 and #6302 or #6303 (6) or #3211 and #3703 (11) (<)**(Canada and Japan only > 4331, 4361:** #1601, #3701, #4695 and #967X or #969X (12)**701-1, 2, 3, 4702:** (6, 16) (<)**(Canada and Japan only > 4730, 4736:** (5, 6) (<)**(Canada and Japan only > 4952, 4954, 4955, 4956, 4959, 4965:** #2074 or #2090 or #2094 or #2096 (6) or #1310**4987:** #4731 or #4731 (6)**5110:** #2074 and #3701 (3)**5150:** (5)**5231:** #4780, #9753 or #9754 and #9481 or #9482 (3)**5251-2, 12:** #3701**5265:** #3701 (7)**5285, 5288:** #3701 (3, 6)**5294-1:** #3701 (<)**(Japan only > 5294-K01:** #3701 (<)**(Canada and Japan only > 5340:** #2500 and #3701 (6, 13)**5360:** #3701 or #4552 (6)**5362:** #2920 (6)**5364:** (6, 19)**5381:** #3701 (6)**5525:** #3701 or #3702**6360:** #3704 or #3705 or #3707 (point-to-point only)**6580:** #3705 (point-to-point only)**6670:** #3701 (6, 7)**7426:** (5)**8101, 8130 A:** #3701 and #1602 or #1604 (6) or #3701 and #1605**8130 B:** #3701 and #1602 (<) (Japan only > or #1604 (<) (Canada and Japan only > (6)**8140 A, B:** #3701 and #1602 or #1604 (6) or #3701 and #1605**8140 C:** #1610, #1611, #1620, #1621, #1622, #1623, or #1630 (6)**8150:** #1732, #1733, #1734, #1735, #1763, or #1764 (6)**8775:** #3701 and #9494**8815-1:** #3701 (6)| **9373, 9375, 9377:** #6030, #6031 (<)**(EXCEPT CANADA > FACILITY G4**

Point-to-point or multipoint synchronous operation at 20.4K, 24K, 40.8K or 48K bps via a 5979-L21A Signal Converter.(2)

**3274-1C, 21C, 31C:** #1550 and #6303**3704:** #2944 or #4717**3705-II:** #2944 or #4717 or #4725 or #4726 (<)**3710:** (Except Canada > #7005 (<)**(Except Canada > 3725-1, 2, 3726:** #4931**3776-3, 4, 3777-3, 4:** #2911 or #4501 (at 20.4K bps only)**3777-1, 2:** #1481 and #2911 or #4501 (at 20.4K bps only) (<)**(Except Canada > 4331, 4361:** #1601, #4695, #4720 and #967X or #969X (12)

4952, 4954, 4955, 4956, 4959, 4965: #2075

8101, 8130 B, 8140 A, B: #1550 and #1602 (14)

8140 C: #1614

8150: #1742 or #1745

I 9373, 9375, 9377: #6030, #6031 (48,000 bps only) <

## Notes for Chart G:

1. The Limited Distance Line Adapters, Types 1A and 1B, are limited to a link of no more than 7.65km (4.75 miles). The Limited Distance Line Adapters, Types 2A and 2B, are limited to a link of no more than 13.25km (8 miles). See GA24-3435 for detailed descriptions of these adapters and the communication links over which they may operate.
2. Contact IBM for more information on attachable DCEs, services, etc.
3. These feature codes will support communication on this facility at 2400 or 4800 bps only.
4. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
5. No special feature is required to attach this DTE to this facility.
6. The 3274 models 1C and 51C, 3276 models 11 thru 14, 3602, 3624, 3631, 3632, 3651, 3684, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4702, 4730, 4736, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 6670, 8101, 8130, 8140, 8150 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704, 3705, 3725-1, 2 or 3726 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities and a 3704/3705 equipped with #4718 or a 3725-1, 2, 3726 equipped with #4911. SDLC also supports the normal data-half-duplex mode of operation over half-duplex or duplex facilities.
7. These feature codes will support communication on this facility at 2400 bps only.
8. These feature codes will support communication on this facility at 4800 bps only.
9. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714 will support the normal data-half-duplex mode of operation on half-duplex or duplex facilities. #4718 will support a data-full-duplex (i.e., simultaneous data transmission in both directions) on duplex communication lines.

10. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex (i.e., simultaneous data transmission in both directions) mode with a 3776 model 3, 3776 model 4 or 3777 model 3. This mode of operation requires duplex communication facilities.
11. The 3276 may be attached as a tributary station on a multipoint line where the control station is a 3791 equipped with the Data Link Adapter, #3211.
12. Specify codes #967X and #969X on the 4331 stipulate in which protocol the 4331 is to communicate, and to which line position on the 4331 that protocol is to be assigned, with the "X" in each case denoting the line position. See the M4331 pages for details.
13. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
14. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614 or an 8150 without ports 1-4 and 9-12.
15. Ignore this note.
16. Communication in the SNA/SDLC protocol requires no special feature on the 4701. Communication in the BSC protocol, "which is limited to a speed no greater than 4800 bps," requires #1422.
17. 3725-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex facilities or a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication lines.
18. The 3725-1, 2, 3726, equipped with #4911 can communicate in data full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This type of communication requires full-duplex communication facilities.
19. The 5364 uses IBM Personal Computer communications facilities. For speeds greater than 4800 bps, not for use with BSC when the directly-attached IBM Personal Computer is a 5150 (Personal Computer) or a 5160 (Personal Computer XT).

**2700 CHART K - PUBLIC SWITCHED DATA NETWORKS (PSDNs)****CHART K - PUBLIC SWITCHED DATA NETWORKS (PSDNs)**

**Note:** This chart is for Public Switched Data Networks providing (Japan only > a CCITT "V" or "X.bis" interface. <) (Canada only > an EIA RS-232-C or CCITT V.35 interface. <)

For each machine type, the special features required for attachment are shown.

**(CANADA ONLY > FACILITY K1M)**

Start/Stop operation at 134.5 or 300 bps on a PSDN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

--2701: #4640 and #9581 (at 134.5 bps only)

--3138: #4640 and #9721 (2)

--3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)

--3705-80: No special feature required at 134.5 bps or #1413 (at 300 bps)

--3708: No special feature required.

--3710: #7001 or #7005

--3725-1, 2, 3726: #4911 and #4666 (19)

--3792: #3701 (at 134.5 bps only)

--3845, 3846: (4, 9)

--4331, 4361: #1601, #3701, #4696 and #968X (3)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730

--5110: #1525 (at 134.5 bps only)

| --9373, 9375, 9377: #6030, #6031 <)

**(JAPAN ONLY > FACILITY K3)**

Synchronous operation at 2400 bps on the NTT DDX Network in Japan. (1, 10)

--3138: #4640, #9609 and #9649 (2)

--3274-51C: #3701, #9112 and #6302 or #6303 (SDLC only)

--3276-11, 14: #3701, #6302 and #9490 (SDLC only)

--3602: #3701 and #4502 or #6302

--3631, 3632: #3701 and #4502 or #6302

--3651-25, 50: #2822 and #2891 or #2897

--3651-75: #2822 and #2891 or #2897 and/or #6185 and #2725 or #2727

--3684: #3701 and #9822

--3694: #3701 and #4502

--3704: #4714

--3705-II: #4714 (7)

--3705-80: No special feature required (7)

--3708: No special feature required.

--3710: #7001 or #7005

--3725-1, 2, 3726: #4911

--3741: #9121

--3771, 3774, 3775: #1481 and #3701

--3776-1, 2, 3777-1, 2: #1481 and #3701

--3776-3, 4, 3777-3, 4: #3701

--3791: #3701 and #6302 or #6303 (5)

--3845, 3846: (4, 9)

--4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)

--4701-1, 2, 3, 4702: (13)

--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #1310

--4987: #4730 or #4731

--5110: #2074 and #3701 (11)

--5231: #2074, #4780, #9483 and #9753 (11)

--5251-2, 12: #3701

--5285: #3701

--5285, 5288: #3701, #9483 and #9753

--5294-1: #3701 (15)

--5294-K01: #3701 (15)

--5340: #3701 (8, 11)

--5360: #3701 or #4552 (11)

--5362: #2920 (11)

--5364: (20)

--5381: #3701 (11)

--5525: #3701 or #3702

--6670: #3701

--8101, 8130, 8140 A, B: #1602 and #3701

--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630

--8150: #1732, #1733, #1734, #1735, #1763 or #1764

--8775: #3701 and #9493

--8815-1: #3701

| --9373, 9375, 9377: #6030, #6031 <)

## MACHINES

### (CANADA ONLY > FACILITY K3M)

Synchronous operation at 2400 bps on a PSDN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

- 2701: #7698 (6)
- 3138: #4640, #9609 and #9649 (2)
- 3274-51C: #3701, #9112 and #6302 or #6303
- 3276-11, 14: #3701, #6302 and #9490
- 3602: #3701 and #4502 or #6302
- 3631, 3632: #3701 and #4502 or #6302
- 3651-25: #2897 and #9150
- 3651-50: #9120
- 3651-75: #9120 and/or #6185
- 3684: #3701 and #9822
- 3694: #3701 and #4502
- 3704, 3705-II: #4714 (7)
- 3705-80: No special feature required
- 3708: No special feature required.
- 3710: #7001 or #7005
- 3725-1, 2, 3726: #4911
- 3741: #9121
- 3771, 3774, 3775: #1481 and #3701
- 3776-1, 2, 3777-1, 2: #1481 and #3701
- 3776-3, 4, 3777-3, 4: #3701
- 3791: #3701 and #6302 or #6303 (5)
- 3845, 3846: (4, 9)
- 4331, 4361: #1601, #3701, #4696 and #968X (3)
- 4701-1, 2, 3, 4702: (13)
- 4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310
- 4987: #4730
- 5110: #2074 and #3701
- 5231: #4780, #9483 and #9753
- 5251-2, 12: #3701
- 5265: #3701
- 5285, 5288: #3701
- 5294-1: #3701 (15)
- 5340: #3701 (8)
- 5360: #3701 or #4552
- 5362: #2920

- 5364: (20)
- 5381: #3701
- 5525: #3701 or #3702
- 6670: #3701
- 8101, 8130, 8140 A, B: #1602 and #3701
- 8140 C: #1610, #1611, #1620, #1621, #1622, or #1630
- 8150: #1732, #1733, #1734, #1735, #1763 or #1764
- 8775: #3701 and #9493
- 8815-1: #3701
- 9373, 9375, 9377: #6030, #6031 (<)

### (JAPAN ONLY > FACILITY K4)

Synchronous operation at 4800 bps on the NTT DDX Network in Japan. (1, 10)

- 3138: #4640, #9609 and #9649 (2)
- 3274-51C: #3701, #9112 and #6302 or #6303 (SDLC only)
- 3276-11, 14: #3701, #6302 and #9490 (SDLC only)
- 3602: #3701 and #4502 or #6302
- 3631, 3632: #3701 and #4502 or #6302
- 3651-25, 50: #9126
- 3651-75: #9126 and/or #6185
- 3684: #3701 and #9823
- 3694: #3701 and #4502
- 3704: #4714
- 3705-II: #4714 (7)
- 3705-80: No special feature required (7)
- 3708: No special feature required.
- 3710: #7001 or #7005
- 3725-1, 2, 3726: #4911
- 3771, 3774, 3775: #1481 and #3701
- 3776-1, 2, 3777-1, 2: #1481 and #3701
- 3776-3, 4, 3777-3, 4: #3701
- 3791: #3701 and #6302 or #6303 (5)
- 3845, 3846: (4, 9)
- 4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)
- 4701-1, 2, 3, 4702: (13)
- 4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #1310
- 4987: #4730 or #4731
- 5110: #2074 and #3701 (11)

## MACHINES

--5231: #2074, #4780, #9483 and #9754 (11)  
 --5251-2, 12: #3701  
 --5285, 5288: #3701  
 --5294-1: #3701 (15)  
 --5294-K01: #3701 (15)  
 --5340: #3701 (8, 11)  
 --5360: #3701 or #4552 (11)  
 --5362: #2920 (11)  
 --5364: (20)  
 --5381: #3701 (11)  
 --5525: #3701 or #3702  
 --6670: #3701  
 --8101, 8130, 8140 A, B: #1602 and #3701  
 --8140 C: #1610, #1611, #1620, #1621, #1622, or #1630  
 --8150: #1732, #1733, #1734, #1735, #1763 or #1764  
 --8775: #3701 and #9493  
 --8815-1: #3701  
 | --9373, 9375, 9377: #6030, #6031 (<)

### (CANADA ONLY > FACILITY K4M)

Synchronous operation at 4800 bps on a PSDN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

--2701: #7698 (6)  
 --3138: #4640, #9609 and #9649 (2)  
 --3274-51C: #3701, #9112 and #6302 or #6303  
 --3276-11, 14: #3701, #6302 and #9490  
 --3602: #3701 and #4502 or #6302  
 --3631, 3632: #3701 and #4502 or #6302  
 --3651-25: #2846 and #9150  
 --3651-50: #9126  
 --3651-75: #9126 and/or #6185  
 --3684: #3701 and #9823  
 --3694: #3701 and #4502  
 --3704, 3705-II: #4714 (7)  
 --3705-80: No special feature required  
 --3708: No special feature required.  
 --3710: #7001 or #7005  
 --3725-1, 2, 3726: #4911  
 --3771, 3774, 3775: #1481 and #3701

--3776-1, 2, 3777-1, 2: #1481 and #3701  
 --3776-3, 4, 3777-3, 4: #3701  
 --3791: #3701 and #6302 or #6303 (5)  
 --3845, 3846: (4, 9)  
 --4331, 4361: #1601, #3701, #4696 and #968X (3)  
 --4701-1, 2, 3, 4702: (13)  
 --4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310  
 --4987: #4730 or #4731  
 --5110: #2074 and #3701  
 --5231: #2074, #4780, #9483 and #9754  
 --5251-2, 12: #3701  
 --5285, 5288: #3701  
 --5294-1: #3701 (15)  
 --5340: #3701 (8)  
 --5360: #3701 or #4552  
 --5362: #2920  
 --5364: (20)  
 --5381: #3701  
 --5525: #3701 or #3702  
 --8101, 8130, 8140 A, B: #1602 and #3701  
 --8140 C: #1610, #1611, #1620, #1621, #1622 or #1630  
 --8150: #1732, #1733, #1734, #1735, #1763 or #1764  
 --8775: #3701 and #9493  
 --8815-1: #3701  
 | --9373, 9375, 9377: #6030, #6031 (<)

### (JAPAN ONLY > FACILITY K5)

Synchronous operation at 9600 bps on the NTT DDX Network in Japan (1, 10)

--3274-51C: #3701, #9112 and #6302 or #6303 (SDLC only)  
 --3276-11, 14: #3701, #6302 and #9490 (SDLC only)  
 --3602: #3701 and #4502  
 --3631, 3632: #3701 and #4502  
 --3694: #3701 and #4502  
 --3704, 3705-II: #4714 (7)  
 --3705-80: No special feature required (7)  
 --3708: No special feature required.  
 --3710: #7001 or #7005  
 --3725-1, 2, 3726: #4911

## MACHINES

--3776-3, 4, 3777-3, 4: #3701  
--3777-1, 2: #1481 and #3701  
--3791: #3701 and #6303 (5)  
--3845, 3846: (4, 9)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)  
--4701-1, 2, 3, 4702: (13)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #1310  
--4987: #4730 or #4731  
--5251-2, 12: #3701  
--5294-1, K01: #3701 (15)  
--5340: #2500 and #3701 (8, 11)  
--5360: #3701 or #4552 (11)  
--5362: #2920 (11)  
--5364: (20, 21)  
--5381: #3701 (11)  
--6670: #3701  
--8101, 8130, 8140 A, B: #1602 and #3701  
--8140 C: #1610, #1611, #1620, #1621, #1622, or #1630  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764  
--8775: #3701 and #9493  
--8815-1: #3701  
| --9373, 9375, 9377: #6030, #6031 (<)

### (CANADA ONLY > FACILITY K5M)

Synchronous operation at 9600 bps on a PSDN via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy (1)

--3274-51C: #3701, #9112 and #6302 or #6303  
--3276-11, 14: #3701, #6302 and #9490  
--3602: #3701 and #4502  
--3631, 3632: #3701 and #4502  
--3694: #3701 and #4502  
--3704, 3705-II: #4714 (7)  
--3705-80: No special feature required  
--3708: No special feature required.  
--3710: #7001 or #7005  
--3725-1, 2, 3726: #4911  
--3776-3, 4, 3777-3, 4: #3701  
--3777-1, 2: #1481 and #3701  
--3791: #3701 and #6303 (5)

--3845, 3846: (4, 9)  
--4331, 4361: #1601, #3701, #4696 and #968X (3)  
--4701-1, 2, 3, 4702: (13)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 or #1310  
--4987: #4730 or #4731  
--5251-2, 12: #3701  
--5294-1: #3701 (15)  
--5340: #2500 and #3701 (8)  
--5360: #3701 or #4552  
--5362: #2920  
--5364: (20, 21)  
--5381: #3701  
--8101, 8130, 8140 A, B: #1602 and #3701  
--8140 C: #1610, #1611, #1620, #1621, #1622 or #1630  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764  
--8775: #3701 and #9493  
--8815-1: #3701  
| --9373, 9375, 9377: #6030, #6031 (<)

### --Notes for Chart K

1. Contact IBM for information on these facilities, including attachable DCEs.
2. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.
3. Specify codes #967X, #968X and #969X on the 4331 or 4361 stipulate in which protocol the 4331 or 4361 is to communicate, and to which line position on the 4331 or 4361 that protocol is to be assigned, with the "X" in each case being the line position. See the M4331 or 4361 pages for details. Note: On the 4361, specify codes #967X and #969X are not required.
4. No special feature is required to attach this DTE to this facility.
5. 3791 switched network operation is supported at the 3704, 3705, 3725-1, 2, or 3726 by nonswitched programming. Special procedures are required to establish and disconnect the link. Refer to the VTAM and 3790 operation instructions for the appropriate procedures.
6. The 2701 feature code listed is for the attachment of a single synchronous communication line. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second line may be attached.
7. A 3705, equipped with the "Remote Program Loader" feature, #6261, may serve as a "Remote" and communicate with a "Local" 3705-II or 3705-80. Their primary communication link must be a nonswitched line and, therefore, communication over this facility between a "Remote" and a "Local" 3705-II or 3705-80 can only be as a secondary, alternate, path to the primary nonswitched communication link.
8. The listed 5340 feature codes are for the attachment of a single communication line. A second line may be attached to a 5340 equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.

9. The 3845 and 3846 are data encryption/decryption devices inserted between the DTE and the DCE. The DCE must satisfy the requirements of (Japan only > CCITT Recommendations V.24 and V.28 <) (Canada only > EIA RS-232-C <) to allow this insertion.
10. When attached to this Network via the CCITT X.21bis interface (as noted), these DTEs will communicate with DTEs attached to this Network via the CCITT X.21 interface. See facilities L3, L4 and L5 in Chart L for information on the DTEs attachable to this Network via a CCITT X.21 interface.
11. (Japan only > These DTEs will operate on the NTT's DDX Network in Japan in Manual Calling, Manual Answering modes only. <)
12. Ignore this note.
13. Communication in the SNA/SDLC protocol does not require any special feature on the 4701. Communication in the BSC protocol, which is limited to a speed of no greater than 4800 bps, requires #1422.
14. Ignore this note.
15. The 3274, 5294, 5340, 5360, 5362, and 5525 support the following network facilities:
  - Manual address call
  - Manual direct call
  - Automatic answering
16. Ignore this note.
17. Ignore this note.
18. A 3725-1, 2 or 3726 may serve as a "Remote" and communicate with a "Local" 3704, 3705, 3725-1, 2, or 3726. Their primary communication link must be a nonswitched line and, therefore, communication over this facility between a "Remote" and a "Local" 3704, 3705 or 3725-1, 2, 3726 can only be as a secondary, alternate path to the primary nonswitched communication link.
19. This feature is only required for the 3725-1 and the 3726, not for the 3725-2.
20. The 5364 uses IBM Personal Computer communications facilities.
21. For the 5364, not for use with BSC when the directly-attached IBM Personal Computer is a 5150 (Personal Computer) or a 5160 (Personal Computer XT).

## 2700 CHART L - CIRCUIT SWITCHED PUBLIC DATA NETWORKS

### CHART L - CIRCUIT SWITCHED PUBLIC DATA NETWORKS

**Note:** This chart is for Circuit Switched Public Data Networks providing a CCITT "X" series interface.

For each machine type, the special features required for attachment are shown.

#### FACILITY L3

Synchronous operation at 2400 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287. (Japan only> Includes the D-221 DCE on the NTT's DDX Network in Japan.<) (1)

- 3274-51C: #5656, #6303 and #9112 (2, 5)
- 3274-61C: #5656 and #6303 (2, 5)
- 3276-11, 14: #1068, #5656 and #6302 (2, 5)
- 3602: #5656 and #4502 (2, 5)
- 3705-II: #5656 and #9840 (2, 3, )
- 3705-81, 3705-82: #5657 and #9775 (2, 3, )
- 3705-84: No special feature required (2, 3, 8) (optional features #5657 and #9775)
- 3725-1, 2, 3726: #4941 (2, 8)
- 4701-1, 2, 3: #5656 (2, 5)
- 4702: #5656 (2, 5)
- 5294-1(Except Canada >, K01 <): #5655 and #5656 (2, 7)
- 5340: #5371 or #5372 or #5373 or #5374 (2)
- 5360: #5655 or #4554 (2)
- 5362: #2954 (2)
- 8101 A2X, 8130, 8140 B: #1602 and #5656 (2)
- 8140 C: #1612 (2)
- 8150: #1752 or #1755 (2)
- 9373, 9375, 9377: #6030, #6031

#### FACILITY L4

Synchronous operation at 4800 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287. (Japan only> Includes the D-221 DCE on the NTT's DDX Network in Japan.<)(1)

- 3274-51C: #5656, #6303 and #9112 (2, 5)
- 3274-61C: #5656 and #6303 (2, 5)
- 3276-11, 14: #1068, #5656 and #6302 (2, 5)
- 3705-II: #5656 and #9840 (2, 3, 8)
- 3705-81, 3705-82: #5657 and #9775 (2, 3, 8)
- 3705-84: No special feature required (2, 3, 8) (optional features #5657 and #9775)

- 3725-1, 2, 3726: #4941 (2, 8)
- 4701-1, 2, 3: #5656 (2, 5)
- 4702: #5656 (2, 5)
- 5294-1(Except Canada >, K01 <): #5655 and #5656 (2, 7)
- 5340: #5371 or #5372 or #5373 or #5374 (2)
- 5360: #5655 or #4554 (2)
- 5362: #2954 (2)
- 8101 A2X, 8130, 8140 B: #1602 and #5656 (2)
- 8140 C: #1612 (2)
- 8150: #1752 or #1755 (2)
- 9373, 9375, 9377: #6030, #6031

#### FACILITY L5

Synchronous operation at 9600 bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287. (Japan only> Includes the D-221 DCE on the NTT's DDX Network in Japan.<) (1)

- 3274-51C: #5656, #6303 and #9112 (2, 5)
- 3274-61C: #5656 and #6303 (2, 5)
- 3276-11, 14: #1068, #5656 and #6302 (2, 5)
- 3602: #5656 and #4502 (2, 5)
- 3705-II: #5656 and #9840 (2, 3, 8)
- 3705-81, 3705-82: #5657 and #9775 (2, 3, 8)
- 3725-1, 2, 3726: #4941 (2, 8)
- 4701-1, 2, 3: #5656 (2, 5)
- 4702: #5656 (2, 5)
- 5294-1(Except Canada >, K01 <): #5655 and #5656 (2, 7)
- 5340: #5371 or #5372 or #5373 or #5374 (2)
- 5360: #5655 or #4554 (2)
- 5362: #2954 (2)
- 8101 A2X, 8130, 8140 B: #1602 and #5656 (2)
- 8140 C: #1612 (2)
- 8150: #1752 or #1755 (2)
- 9373, 9375, 9377: #6030, #6031

#### FACILITY L6

Synchronous operation at 48K bps on a public switched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287(Japan only>, including the D-231 DCE on the NTT's DDX Network in Japan.<).

--3274-51C: #5656, #6303 and #9112

--3705-II: #5656 and #9841 (3)

--3705-81, 3705-82: #5658 and #9776 (3)

--3705-84: No special feature required (3)

--3725-1, 2, 3726: #4942

--5294-1(Except Canada >, K01 <): #5655 and #5656 (2, 7)

--5340: #5371 or #5372 or #5373 or #5374 (2)

--5360: #5655 or #4554 (2)

--5362: #2954 (2)

--8101 A2X, 8130 B, 8140 B: #1602 and #5656 (2, 4)

--8140 C: #1612 (2)

--8150: #1752 or #1755 (2)

| --9373, 9375, 9377: #6030, #6031

--Notes for Chart L

1. Contact IBM for more information on attachable DCEs, services, etc.
2. When attached to a Network via the CCITT X.21 interface feature (as noted), these DTEs may communicate with other DTEs attached to this network via a CCITT X.21bis interface. (Except Canada > See Facilities K3, K4 and K5 in Chart K for information on DCEs attachable via a CCITT X.21bis interface. <)
3. 3705-II X.21 switched operation requires the use of a Type 2 Communication Scanner. Switched X.21 operation on the 3705-II and the 3705-80 is supported by ACF/NCP/VS Release 3, ACF/VTAM Release 3 and ACF/TCAM Version 2 Release 3. User Facilities as defined in CCITT Recommendation X.2 are supported as follows:
  - Automatic Answering.
  - Address Calling and Abbreviated Address Calling Only address blocks, consisting of a single address signal are

supported, and abbreviated address calling is supported on a per-call basis only.

- Direct Call is supported on a contractual or a per-call basis.
  - Closed User Groups are supported on a contractual basis only, with both Preferred and Nonpreferred Groups included. The Facility Request Block used to select the Closed User Group (CUG) may only consist of a single Facility Request Signal, to be followed by an Address Block as described under Address Calling above. Please note that the Facility Request Codes for a CUG may vary from country to country. Your local teleprocessing coordinator should be contacted for details.
  - Call Progress Signalling is reported via an operator message containing the Call Progress Signal (CPS) code and a brief message of its significance. Those CPSs defined in Annex 6 of Recommendation X.21 are recognized, with the exception of CPSs 82 and 83, which are related to a currently unsupported user facility. Any unrecognized CPS that is received is reported via an operator message that states that this is an "Unrecognized CPS".
4. The 8101 A2X cannot attach to an 8130 or 8140 C containing #1610-#1614 or to an 8150 without ports 1-4 and 9-12.
  5. The 3274, 3276, 3602 and 4701 X.21 switched interface features will support the following network facilities as defined in CCITT Recommendation X.2:
    - Abbreviated address call
    - Direct call
    - Call progress signalling
    - Closed user groupsIgnore this note.
  6. The 5294 with the X.21 Switched Interface feature will support the following network facilities as defined in CCITT Recommendation X.2:
    - Address call
    - Abbreviated address call
    - Direct call
    - Auto answer
    - Call progress signaling
    - Closed user groups
  7. The 3705 and 3725/26 do not support the TELEX-DAT1 network in Italy.

## 2700 CHART M - NONSWITCHED DATA NETWORKS

### CHART M - NONSWITCHED PUBLIC DATA NETWORKS

**Note:** This chart is for Nonswitched Public Data Networks providing (Canada only > an EIA RS-232-C or CCITT V.35 interface. <) (Except Canada > a CCITT "V" or "X.bis" interface. <)

For each machine type, the special features required for attachment are shown.

#### (CANADA ONLY > FACILITY M1

Point-to-point or multipoint start/stop operation at 134.5 or 300 bps on the CN/CPT INFODAT Network via a GDC108 DCE or on the TCTS DATAROUTE Network via an LDDS611 or a Characterplexer DCE. (1)

--3101: (4)

--3138: #4640 and #9721 (2)

--3161, 3163: (4)

--3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)

--3705-80: No special feature required at 134.5 bps or #1413 (at 300 bps)

--3708: No special feature required.

--3710: #7001 or #7005

--3725-1, 2, 3726: #4911 and #4666 (18)

--3845, 3846: (4, 10)

--4331, 4361: #1601, #3701, #4696 and #968X (3)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730 or #4731

--5110: #1525 (point-to-point only)

--8101, 8130, 8140 A, B: #1603 and #3701 (point-to-point only)

--9373, 9375, 9377: #6030, #6031, #6032 <)

#### (CANADA ONLY > FACILITY M1M

Point-to-point or multipoint start/stop operation at 134.5 or 300 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--3101: (4)

--3138: #4640 and #9721 (2)

--3161, 3163: (4)

--3704, 3705-II: #4711 or #4714 and #9606 (at 134.5 bps) or #9612 (at 300 bps)

--3705-80: No special feature required at 134.5 bps or #1413 (at 300 bps)

--3708: No special feature required.

--3710: #7001 or #7005

--3725-1, 2, 3726: #4911 and #4666 (18)

--3792: #3701 (at 134.5 bps only)

--3845, 3846: (4, 10) <)

--(Canada only > 4331, 4361: #1601, #3701, #4696 and #968X (3)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730 or #4731

--5110: #1525 (point-to-point only)

--8101, 8130 A, 8140 A, B: #1603 and #3701 (point-to-point only) <)

--(Canada only > 8130 B: #1603 and #3701 (point-to-point only) <)

--(Canada only > 9373, 9375, 9377: #6030, #6031, #6032 <)

#### (CANADA ONLY > FACILITY M2

Point-to-point or multipoint start/stop operation at 600 or 1200 bps on the CN/CPT INFODAT Network via a GDC202 DCE (1) or on the TCTS DATAROUTE Network via an LDDS611 or a Characterplexer DCE. (1)

--3101: (4)

--3138: #4640 and #9721 (2)

--3161, 3163: (4)

--3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps) or #9608 (at 1200 bps)

--3705-80: #1415

--3708: No special feature required.

--3710: #7001 and #7005

--3725-1, 2, 3726: #4911 and #4666 (18)

--3845, 3846: (4, 10)

--4331, 4361: #1601, #3701, #4696 and #968X (3)

--4952, 4954, 4955, 4956, 4959, 4965: #1610 or #2092 or #2096

--4987: #4730 or #4731

--8101, 8130 B, 8140 A, B: #1603 and #3701 (point-to-point only)

--9373, 9375, 9377: #6030, #6031, #6032 <)

#### (CANADA ONLY > FACILITY M2M

Point-to-point or multipoint start/stop operation at 600 or 1200 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy. (1)

--3101: (4)

--3138: #4640 and #9721 (2)

--3161, 3163: (4)

--3704, 3705-II: #4711 or #4714 and #9607 (at 600 bps) or #9608 (at 1200 bps)

## MACHINES

--3705-80: #1415  
--3708: No special feature required.  
--3710: #7001 or #7005  
--3725-1, 2, 3726: #4911 and #4666 (18)  
--3845, 3846: (4, 10) <  
--(Canada only > 4331, 4361: #1601, #3701, #4696 and #968X (3)  
--4387: #4730 or #4731  
--8101, 8140 A, B: #1603 and #3701 (point-to-point only)  
--9373, 9375, 9377: #6030, #6031, #6032 <

## FACILITY M3

Point-to-point or multipoint synchronous operation at 2400 bps on the (Except Canada > TRANSDATA Network in Brazil or the NTT's DDC Network in Japan. <) (Canada only > CN/CPT INFODAT Network or TCTS DATAROUTE Network in Canada. <)  
(1)

--3138: #4640, #9609 and #9649 (2)  
--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (8)  
--3274-51C: #3701 and #6302 or #6303 (8)  
--(Japan only > 3274-52C: #3701 and #6302 or #6303 (8) <  
--3276-1, 4: #3701, #6302 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (8)  
--3602: #3701 and #4502 or #6302 (8)  
--3624: #3701 and #1422 or #6302 (8, 14)  
--3631, 3632: #3701 and #4502 or #6302 (8, 14)  
--3651-25, 50: #2891 or #9150 and #2825 or #2826 (8, 12)  
--3651-75: #2891 and #2825 or #2826 or #6185 and #2727 (8, 12)  
--3684: #3701 and #9822 (8)  
--(Japan and Canada only > 3694: #3701 and #4502 (8) <  
--3704, 3705-II: #4714 or #4718 (8, 9, 11)  
--3705-80: No special feature required.  
--3708: No special feature required.  
--3710: #7001 or #7005  
--3720, 3721, 3725-1, 2, 3726: #4911 (8, 14, 16, 17, 20)  
--3741: #2981  
--3771, 3774, 3775: #1481 and #3701 (8)  
--3776-1, 2, 3777-1, 2: #1481 and #3701 (8)  
--3776-3, 4, 3777-3, 4: #3701 (8)  
--3791: #3701 and #6302 or #6303 (8) or #3211 and #3703 (6)  
--3845, 3846: (4, 10)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)

--4701-1, 2, 3, 4702: (8, 15)  
--(Canada only > 4730, 4736: (4, 8) <  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8, 14) or #1310  
--4987: #4730 or #4731 (8, 14)  
--5110: #2074 and #3701 (14)  
--(Canada only > 5150: (4) <  
--5231: #2074, #4780, #9753 and #9481 or #9482 (14)  
--5251-2, 12: #3701 (14)  
--5265: #3701 (14)  
--5285, 5288: #3701, #9753 and #9481 or #9482 (14)  
--5294-1: #3701  
--(Except Canada > 5294-K01: #3701 <  
--5340: #2500 and #3701 (7, 8, 14)  
--5360: #3701 or #4552 (8, 14)  
--5362: #2920 (8, 14)  
--5364: (8, 19)  
--5381: #3701 (8, 14)  
--5525: #3701 or #3702 (14)  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--6670: #3701 (8, 14)  
--7426: (4)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (8) or #3701 and #1605 (14)  
--8130 B: #3701 and #1602 or #1604 (8)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8, 14) or #1623 (14)  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (8)  
--8775: #3701 and #9494 (14)  
--8815-1: #3701 (8)  
--9373, 9375, 9377: #6030, #6031

## (CANADA ONLY > FACILITY M3M

Point-to-point or multipoint synchronous operation at 2400 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy.  
(1)

--2701: #7698 (5)  
--3138: #4640, #9609 and #9649 (2)  
--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (8)  
--3274-51C: #3701 and #6302 or #6303 (8)  
--3276-1, 4: #3701, #6302 and #9491

## MACHINES

--3276-11, 14: #3701, #6302 and #9491 (8)  
 --3602: #3701 and #4502 or #6302 (8)  
 --3624: #3701 and #1422 or #6302 (8)  
 --3631, 3632: #3701 and #4502 or #6302 (8)  
 --3651-25, 50: #9121 or #9122 (8, 12)  
 --3651-75: #9121 or #9122 (8) or #6185 (12)  
 --3684: #3701 and #9822 (8)  
 --3694: #3701 and #4502 (8)  
 --3704, 3705-II: #4714 or #4718 (8, 9, 11)  
 --3705-80: No special feature required  
 --3708: No special feature required.  
 --3710: #7001 or #7005  
 --3725-1, 2, 3726: #4911 (8, <)(Canada only > 14, <)(Canada only > 16)  
 --3741: #9121  
 --3771, 3774, 3775: #1481 and #3701 (8)  
 --3776-1, 2, 3777-1, 2: #1481 and #3701 (8)  
 --3776-3, 4, 3777-3, 4: #3701 (8, 9)  
 --3791: #3701 and #6302 or #6303 (8) or #3211 and #3703 (6)  
 --3845, 3846: (4, 10) <  
 --(Canada only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)  
 --4701-1, 2, 3, 4702: (8, 15)  
 --4730, 4736: (4, 8)  
 --4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8) or #1310  
 --4987: #4730 or #4731 (8)  
 --5110: #2074 and #3701  
 --5150: (4)  
 --5231: #2074, #4780, #9753 and #9481 or #9482  
 --5251-2, 12: #3701  
 --5265: #3701  
 --5285, 5288: #3701, #9753 and #9481 or #9482  
 --5294-1: #3701  
 --5340: #2500 and #3701 (7, 8)  
 --5360: #3701 or #4552 (8)  
 --5362: #2920 (8)  
 --5364: (8, 19)  
 --5381: #3701 (8)  
 --5525: #3701 or #3702

--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
 --6670: #3701 (8)  
 --8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (8) or #3701 and #1605  
 --8130 B: #3701 and #1602 <)(Canada only > or #1604 <)(Canada only > (8)  
 --8140 C: #1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623  
 --8150: #1732, #1733, #1734, #1735, #1763 or #1764 (8)  
 --8775: #3701 and #9494  
 --8815-1: #3701 (8)  
 --9373, 9375, 9377: #6030, #6031 <)

## FACILITY M4

Point-to-point or multipoint synchronous operation at 4800 bps on the (Except Canada > TRANSDATA Network in Brazil or the NTT's DDC Network in Japan. <)(Canada only > CN/CPT INFODAT Network or TCTS DATAROUTE Network in Canada. <)(1)

--3138: #4640, #9609 and #9649 (2)  
 --3274-1C, 21C, 31C: #3701 and #6302 or #6303 (8)  
 --3274-51C: #3701 and #6302 or #6303 (8)  
 --(Japan only > 3274-52C: #3701 and #6302 or #6303 (8) <  
 --3276-1, 4: #3701, #6302 and #9491  
 --3276-11, 14: #3701, #6302 and #9491 (8)  
 --3602: #3701 and #4502 or #6302 (8)  
 --3624: #3701 and #1422 or #6302 (8, 14)  
 --3631, 3632: #3701 and #4502 or #6302 (8, 14)  
 --3651-25, 50: #2827 or #2828 and #2846 or #2954 or #9150 (8)  
 --3651-75: #2827 or #2828 and #2846 or #2954 (8)  
 ---- 3684: #3701 and #9823  
 --(Canada and Japan only > 3694: #3701 and #4502 (8) <  
 --3704, 3705-II: #4714 or #4718 (8, 9, 11)  
 --3705-80: No special feature required  
 --3708: No special feature required.  
 --3710: #7001 or #7005  
 --3720, 3721, 3725-1, 2, 3726: #4911 (8, 14, 16, 17, 20)  
 --3771, 3774, 3775: #1481 and #3701 (8)  
 --3776-1, 2, 3777-1, 2: #1481 and #3701 (8)  
 --3776-3, 4, 3777-3, 4: #3701 (8, 9)  
 --3791: #3701 and #6302 or #6303 (8) or #3211 and #3703 (6)  
 --3845, 3846: (4, 10)  
 --4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)

## MACHINES

--4701-1, 2, 3, 4702: (8, 15)  
--(Canada only > 4730, 4736: (4, 8) <)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8, 14) or #1310  
--4987: #4730 or #4731 (8, 14) #1310  
--5110: #2074 and #3701 (14)  
--(Canada only > 5150: (4) <)  
--5231: #2074, #4780, #9754 and #9481 or #9482 (14)  
--5251-2, 12: #3701 (14)  
--5285, 5288: #3701, #9754 and #9481 or #9482 (8, 14)  
--5294-1: #3701  
--(Except Canada > 5294-K01: #3701 <)  
--5340: #2500 and #3701 (7, 8, 14)  
--5360: #3701 or #4552 (8, 14)  
--5362: #2920 (8, 14)  
--5364: (8, 19)  
--5381: #3701 (8, 14)  
--5525: #3701 or #3702 (14)  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (8) or #3701 and #1605 (14)  
--8130 B: #3701 and #1602 or #1604 (8)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8, 14) or #1623 (14)  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (8)  
--8775: #3701 and #9494 (14)  
--8815-1: #3701 (8)  
--9373, 9375, 9377: #6030, #6031

### (CANADA ONLY > FACILITY M4M

Point-to-point or multipoint synchronous operation at 4800 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy.  
(1)

--2701: #7698 (5)  
--3138: #4640, #9609 and #9649 (2)  
--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (8)  
--3274-51C: #3701 and #6302 or #6303 (8)  
--3276-1, 4: #3701, #6302 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (8)  
--3602: #3701 and #4502 or #6302 (8)  
--3624: #3701 and #1422 or #6302 (8)

--3631, 3632: #3701 and #4502 or #6302 (8)  
--3651-25, 50: #9124 or #9125 (8)  
--3651-75: #9124 or #9125 (8)  
--3684: #3701 and #9823  
--3694: #3701 and #4502 (8)  
--3704, 3705-II: #4714 or #4718 (8, 9, 11)  
--3705-80: No special feature required  
--3708: No special feature required.  
--3710: #7001 or #7005  
--3725-1, 2, 3726: #4911 (8, <)(Canada only > 14 <) (Canada only > 16)  
--3771, 3774, 3775: #1481 and #3701 (8)  
--3776-1, 2, 3777-1, 2: #1481 and #3701 (8)  
--3776-3, 4, 3777-3, 4: #3701 (8, 9)  
--3791: #3701 and #6302 or #6303 (8) or #3211 and #3703 (6)  
--3845, 3846: (4, 10) <)  
--(Canada only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)  
--4701-1, 2, 3, 4702: (8, 15)  
--4730, 4736: (4, 8)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8) or #1310  
--4987: #4730 or #4731 (8)  
--5110: #2074 and #3701  
--5150: (4)  
--5231: #2074, #4780, #9754 and #9481 or #9482  
--5251-2, 12: #3701  
--5285, 5288: #3701, #9754 and #9481 or #9482 (8)  
--5294-1: #3701  
--5340: #2500 and #3701 (7, 8)  
--5360: #3701 or #4552 (8)  
--5362: #2920 (8)  
--5364: (8, 19)  
--5381: #3701 (8)  
--5525: #3701 or #3702  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--7426: (4)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (8) or #3701 and #1605  
--8130 B: #3701 and #1602 <) or #1604 (Canada only > (8)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623

--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (8)  
--8775: #3701 and #9494  
--8815-1: #3701 (8) <  
I --(Canada only > 9373, 9375, 9377: #6030, #6031 <)

## FACILITY M5

Point-to-point or multipoint synchronous operation at 9600 bps on the (Except Canada > TRANSDATA Network in Brazil or the NTT's DDC Network in Japan. <) (Canada only > CN/CPT INFODAT Network or TCTS DATAROUTE Network in Canada. <)  
(1)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (8)  
--3274-51C: #3701 and #6302 or #6303 (8)  
--3276-1, 4: #3701, #6302, #6315 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (8)  
--3602: #3701 and #4502 (8)  
--3631, 3632: #3701 and #4502 (8, 14)  
--(Japan only > 3694: #3701 and #4502 (8) <  
--(Canada only > 3694: #3701 and #4502 (8) <  
--3704, 3705-II: #4714 or #4718 (8, 9, 11)  
--3705-80: No special feature required  
--3708: No special feature required.  
--3710: #7001 or #7005  
--3720, 3721, 3725-1, 2, 3726: #4911 (8, 14, 16, 17, 20)  
--3776-3, 4, 3777-3, 4: #3701 (8, 9)  
--3777-1, 2: #1481 and #3701 (8)  
--3791: #3701 and #6302 or #6303 (8) or #3211 and #3703 (6)  
--3845, 3846: (4, 10)  
--4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)  
--4701-1, 2, 3, 4702: (8, 15)  
--(Canada only > 4730, 4736: (4, 8) <  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8, 14) or #1310  
--4987: #4730 or #4731 (8, 14)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8, 14) or #1310  
--4987: #4730 or #4731 (8, 14)  
--(Canada only > 5150: (4) <  
--5251-2, 12: #3701 (14)  
--5294-1: #3701  
--(Except Canada > 5294-K01: #3701 <  
--5340: #2500 and #3701 (7, 8, 14)

--5360: #3701 or #4552 (8, 14)  
--5362: #2920 (8, 14)  
--5364: (8, 19)  
--5381: #3701 (8, 14)  
--5525: #3701 or #3702 (14)  
--6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)  
--8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (8) or #3701 and #1605 (14)  
--8130 B: #3701 and #1602 or #1604 (8)  
--8140 C: #1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8, 14) or #1623 (14)  
--8150: #1732, #1733, #1734, #1735, #1763 or #1764 (8)  
--8775: #3701 and #9494 (14)  
--8815-1: #3701 (8)  
I --9373, 9375, 9377: #6030, #6031

## (CANADA ONLY > FACILITY M5M

Point-to-point or multipoint synchronous operation at 9600 bps on a nonswitched public data network via a stand-alone DCE attached under the provisions of the IBM Multiple Supplier Systems Policy.  
(1)

--3274-1C, 21C, 31C: #3701 and #6302 or #6303 (8)  
--3274-51C: #3701 and #6302 or #6303 (8)  
--3276-1, 4: #3701, #6302, #6315 and #9491  
--3276-11, 14: #3701, #6302 and #9491 (8)  
--3602: #3701 and #4502 (8)  
--3631, 3632: #3701 and #4502 (8)  
--3694: #3701 and #4502 (8)  
--3704, 3705-II: #4714 or #4718 (8, 9, 11)  
--3705-80: No special feature required  
--3708: No special feature required.  
--3710: #7001 or #7005  
--3725-1, 2, 3726: #4911 (8, <) 14, (Canada only > 16)  
--3776-3, 4, 3777-3, 4: #3701 (8, 9)  
--3777-1, 2: #1481 and #3701 (8)  
--3791: #3701 and #6302 or #6303 (8) or #3211 and #3703 (6)  
--3845, 3846: (4, 10) <  
--(Canada only > 4331, 4361: #1601, #3701, #4695 and #967X or #969X (3)  
--4701-1, 2, 3, 4702: (8, 15)  
--4730, 4736: (4, 8)  
--4952, 4954, 4955, 4956, 4959, 4965: #2074 or #2090 or #2094 or #2096 (8) or #1310

## MACHINES

- 4987: #4730 or #4731 (8)
- 5150: (4)
- 5251-2, 12: #3701
- 5294-1: #3701
- 5340: #2500 and #3701 (7, 8)
- 5360: #3701 or #4552 (8)
- 5362: #2920 (8)
- 5364: (8, 19)
- 5381: #3701 (8)
- 5525: #3701 or #3702
- 6360, 6580: #3705 (point-to-point only), #3707 (point-to-point only)
- 7426: (4)
- 8101, 8130 A, 8140 A, B: #3701 and #1602 or #1604 (8) or #3701 and #1605
- 8130 B: #3701 and #1602 (<) or #1604 (Canada only >) (8)
- 8140 C: #1610, #1611, #1620, #1621 or #1630 (8) or #1622 (8) or #1623
- 8150: #1732, #1733, #1734, #1735, #1763 or #1764 (8)
- 8775: #3701 and #9494
- 8815-1: #3701 (8)
- | --9373, 9375, 9377: #6030, #6031 (<)

### (JAPAN ONLY > FACILITY M6

Point-to-point or multipoint synchronous operation at 48K bps on the (<) (Japan only > NTT DDC Network in Japan. (1) (<))

- 3274-1C, 21C, 31C: #1550 and #6303 (point-to-point only)
- 3704: #2944
- 3705-II: #2944 or #4726
- 3705-80: #6712
- 3710: #7005
- 3720, 3721, 3725-1, 2, 3726: #4931 (20)
- 4331, 4361: #1601, #4695 #4720 and #967X or #969X (3)
- 4952, 4954, 4955, 4956, 4959, 4965: #2075, #2780
- 8101, 8130 B, 8140 A, B: #1550 and #1602 (13)
- 8140 C: #1614
- 8150: #1742 or #1745
- | --9373, 9375, 9377: #6030, #6031

### --Notes for Chart M:

1. Contact IBM for more information on these facilities, including attachable DCEs, required options, etc.
2. The listed 3138 feature codes are for the attachment of the first communication line. See the M3138 pages for additional line attachment feature codes.

3. Specify codes #967X, #968X and #969X stipulate in which protocol the 4331 or 4361 is to communicate, and to which line position this protocol will be assigned, with the "X" in each case denoting the line position. See the M4331 or 4361 pages for details. Note: On the 4361, specify codes #967X and #969X are not required.
4. No special feature is required to attach this DTE to this facility.
5. The listed feature code is for the attachment of a single synchronous communication line to the 2701. See the description of the "Dual Communications Interface" feature in the M2701 pages for the conditions under which a second synchronous line may be attached.
6. The 3276 may be attached as a tributary station on a multipoint nonswitched line where the control station is a 3791 equipped with the Data Link Adapter, #3210 or #3211. All stations on such a line must operate at the same line speed and use the same type clocking source, i.e., either DTE clock or modem clock, but not a mixture of these two.
7. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 and equipped with #3500. Second, third and fourth lines may be attached to a 5340 equipped with #4500. See the M5340 pages for details.
8. The 3274 models 1C and 51C, 3276 models 11 through 14, 3602, 3624, 3631, 3632, 3651, 3684, 3694, 3771, 3774, 3775, 3776, 3777, 3791, 4701, 4702, 4730, 4736, 4952, 4954, 4955, 4956, 4959, 4965, 4987, 5285, 5288, 5340, 5360, 5362, 5364, 5381, 5382, 6670, 8101, 8130, 8140, 8150 and 8815 may communicate as tributary stations on a multipoint network with a control station 3704, 3705, 3725-1, 2, or 3726 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires duplex communication facilities, and a 3704/3705 equipped with #4718 or a 3725-1, 2, 3726 equipped with #4911.
9. When equipped with #4718, the 3704 or 3705 can communicate in data-full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 model 3, 3776 model 4 or 3777 model 3. This type communication requires duplex communication facilities.
10. The 3845 and 3846 are data encryption/decryption devices, installed between the DTE and the DCE. They will operate at speeds of up to 1200 bps with start/stop DTEs and at speeds of up to 19.2K bps with synchronous DTEs. The DCEs involved must meet the requirements of (Canada only > EIA RS-232-C. <) (Except Canada > CCITT Recommendations V.24 and V.28 or X.21bis. <)
11. 3704/3705 "Remotes" may communicate with 3704/3705 "Locals" over this facility as their primary communication link. #4714 will support the normal data-half-duplex mode of operation on half-duplex or duplex communication facilities. #4718 will support a data-full-duplex operation (i.e., simultaneous data transmission in both directions) on duplex communication facilities.
12. The 3651 will communicate over this facility with a 3704, 3705, 3725-1, 2, or 3726 at the host system, or with a 3659 at a remote store site. See the M3651 pages for the appropriate feature codes for both communications types. See the M3659 pages for the requirements on that unit for the remote store communications.
13. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or 8140 C without #1610-#1614 or with an 8150 without ports 1-4 and 9-12.
14. (Except Canada > These DTEs do NOT support attachment to the TRANSDATA Network in Brazil. <) (Canada only > ignore this note. <)
15. Communication in the SNA/SDLC protocol requires no special feature on the 4701/4702. Communication in the BSC protocol,

which is limited to a speed no greater than 4800 bps, requires #1422.

16. 3525-1, 2, 3726 "Remotes" may communicate over this facility with 3704, 3705 or 3725-1, 2, 3726 "Locals" as their primary communication link. #4911 will support the normal data half-duplex operational mode on half-duplex or duplex communication facilities and a data full-duplex (i.e., simultaneous data transmission in both directions) operational mode on duplex communication facilities.
17. The 3525-1, 2, 3726 equipped with #4911 can communicate in data full-duplex mode (i.e., simultaneous data transmission in both directions) with a 3776 mdl 3 or 4, or a 3777 mdl 3. This

type of communication requires full-duplex communication facilities.

18. For 3725-1 or 3726, feature #4666 or #4667 will be required. After July 1, 1985, #4666 is no longer available. For 3725-2, feature #4667 is not required on a base machine.
19. The 5364 uses IBM Personal Computer communications facilities. For speeds of greater than 4800 bps, not for use with BSC when the directly-attached IBM Personal Computer is a 5150 (Personal Computer) or a 5160 (Personal Computer XT).
20. For the 3720, 3721, 3725 and 3726, the communications link must be defined as a "Full Duplex" facility in the NCP generation.

**2700 CHART N - NONSWITCHED DATA NETWORKS****CHART N - NONSWITCHED PUBLIC DATA NETWORKS**

**Note:** This chart is for Nonswitched Public Data Networks providing a CCITT "X" series interface.

For each machine type, the special features required for attachment are shown.

**FACILITY N3**

Point-to-point or multipoint synchronous operation at 2400 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 (Japan only > , including the D-121 DCE on the NTT's DDC Network in Japan. < )

- (Japan only > 3274-1C: #5655 and #6302 (2) < )
- 3274-21C, 31C, 41C, 51C, 61C: #5655 and #6302 (2)
- (Japan only > 3274-52C: #5655 and #6302 (2) < )
- 3276-11, 14: #5655 and #6302 (2, 7)
- (Japan only > 3602: #5655 and #4502 or #6302 (2) < )
- 3705-II: #5655 and #9842 (2, 7)
- 3705-81, 82: #5657 and #9777 (2, 7)
- 3705-84: No special feature required (2, 7)
- 3710: #7010 (5)
- 3725-1, 2, 3726: #4941 (2, 8)
- (Japan only > 3771, 3774, 3775: #1470, #1481, #5655 and #9822 (2)
- 3776-1, 2: #1470, #1481, #5655 and #9822 (2, 7)
- 3776-3, 4: #5655 and #9822 (2, 7)
- 3777-1: #1470, #1481, #5655 and #9822 (2, 7)
- 3777-3, 4: #5655 and #9822 (2, 7) < )
- 4331: #1601, #4695, #5655 and #969X (2, 3, 7)
- 4361: #1601, #4695, #5655 and #969X (2, 3)
- 4701-1, 2, 3: #5655 (2)
- 4702: #5655 (2)
- 4952, 4954, 4955, 4956, 4959, 4965: #2080
- 5294-1: #5655
- (Except Canada > 5294-K01: #5655 < )
- 5340: #5371 or #5372 or #5373 or #5374
- 5360: #5655 or #4554
- 5362: #2954
- 8101, 8130, 8140 A, B: #1602 and #5655 (2, 7)
- 8140 C: #1613 (2, 7)
- 8150: #1752 or #1755 (2, 7)

--8775: #5655 and #9822 (2)

--8815-1: #5655 (2, 6, 7)

**FACILITY N4**

Point-to-point or multipoint synchronous operation at 4800 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 (Japan only > , including the D-121 DCE on the NTT's DDC Network in Japan. < )

- (Japan only > 3274-1C: #5655 and #6302 (2) < )
- 3274-21C, 31C, 41C, 51C, 61C: #5655 and #6302 (2)
- (Japan only > 3274-52C: #5655 and #6302 (2) < )
- 3276-11, 14: #5655 and #6302 (2, 7)
- (Japan only > 3602: #5655 and #4502 or #6302 (2) < )
- 3705-II: #5655 and #9842 (2, 7)
- 3705-81, 82: #5657 and #9777 (2, 7)
- 3705-84: No special feature required (2, 7)
- 3710: #7010 (5)
- 3725-1, 2, 3726: #4941 (2, 8)
- (Japan only > 3771, 3774, 3775: #1470, #1481, #5655 and #9822 (2)
- 3776-1, 2: #1470, #1481, #5655 and #9822 (2, 7)
- 3776-3, 4: #5655 and #9822 (2, 7)
- 3777-1: #1470, #1481, #5655 and #9823 (2, 7)
- 3777-3, 4: #5655 and #9823 (2, 7) < )
- 4331: #1601, #4695, #5655 and #969X (2, 3, 7)
- 4361: #1601, #4695, #5655 and #969X (2, 3)
- 4701-1, 2, 3: #5655 (2)
- 4702: #5655 (2)
- 4952, 4954, 4955, 4956, 4959, 4965: #2080
- 5294-1: #5655
- (Except Canada > 5294-K01: #5655 < )
- 5340: #5371 or #5372 or #5373 or #5374
- 5360: #5655 or #4554
- 5362: #2954
- 8101, 8130, 8140 A, B: #1602 and #5655 (2, 7)
- 8140 C: #1613 (2, 7)
- 8150: #1752 or #1755 (2, 7)
- 8775: #5655 and #9823 (2)
- 8815-1: #5655 (2, 6, 7)

--9373, 9375, 9377: #6030, #6031

## FACILITY N5

Point-to-point or multipoint synchronous operation at 9600 bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 (Japan only > , including the D-121 DCE on the NTT's DDC Network in Japan. < )

- (Japan only > 3274-1C: #5655 and #6302 (2) < )
- 3274-21C, 31C, 41C, 51C, 61C: #5655 and #6302 (2)
- (Japan only > 3274-52C: #5655 and #6302 (2) < )
- 3276-11, 14: #5655 and #6302 (2, 7)
- (Japan only > 3602: #5655 and #4502 or #6302 (2) < )
- 3705-II: #5655 and #9842 (2, 7)
- 3705-81, 82: #5657 and #9777 (2, 7)
- 3705-84: No special feature required (2, 7)
- 3710: #7010 (5)
- 3725-1, 2, 3726: #4941 (2, 8)
- (Japan only > 3776-3, 4: #5655 and #9825 (2)
- 3777-1: #1470, #1481, #5655 and #9825 (2, 7)
- 3777-3, 4: #5655 and #9825 (2, 7) < )
- 4331: #1601, #4695, #5655 and #969X (2, 3, 7)
- 4361: #1601, #4695, #5655 and #969X (2, 3)
- 4701-1, 2, 3: #5655 (2)
- 4702: #5655 (2)
- 4952, 4954, 4955, 4956, 4959, 4965: #2080
- 5294-1: #5655
- (Except Canada > 5294-K01: #5655 < )
- 5340: #5371 or #5372 or #5373 or #5374
- 5360: #5655 or #4554
- 5362: #2954
- 8101, 8130, 8140 A, B: #1602 and #5655 (2, 7)
- 8140 C: #1613 (2, 7)
- 8150: #1752 or #1755 (2, 7)
- 8775: #5655 and #9825 (2)
- 8815-1: #5655 (2, 6, 7)
- 9373, 9375, 9377: #6030, #6031

## FACILITY N6

Point-to-point or multipoint synchronous operation at 48K bps on a public nonswitched data network via a stand-alone DCE complying with CCITT Recommendation X.21 as it is delineated in GA27-3287 (Japan only > , including the D-121 DCE on the NTT's DDC Network in Japan. < )

--(Japan only > 3274-1C: #5655 and #6302 < )

--3274-21C, 31C, 51C: #5655 and #6303

--3705-II: #5655 and #9843 (7)

--3705-81, 82: #5658 and #9778 (7)

--3705-84: No special feature required (7)

--3710: #7010 (5)

--3725-1, 2, 3726: #4942 (8)

--4331: #1601, #4695, #5655 and #969X (3, 7)

--4361: #1601, #4695, #5655 and #969X (3)

--4952, 4954, 4955, 4956, 4959, 4965: #2080

--5294-1: #5655

--5340: #5371 or #5372 or #5373 or #5374

--5360: #5655 or #4554

--5362: #2954

--8101, 8130 B, 8140 A, B: #1602 and #5655 (4, 7)

--8140 C: #1613 (7)

--8150: #1752 or #1755 (7)

--9373, 9375, 9377: #6030, #6031

## --Notes for Chart N

1. Contact IBM for more information on attachable DCEs, services, etc.
2. The 3274, 3276, (Canada only > 3602, 3771, 3774, 3775, 3776, 3777, < ) (Except Canada > 4701, < ) 8101, 8130, 8140, 8150, 8775 and 8815 will communicate as tributary stations with a control station 3705-II or 3725-1, 2, 3726, or 4331 using Synchronous Data Link Control (SDLC). In a multipoint network, SDLC allows the control station to receive from one tributary station while it is transmitting to another tributary station. Operation in this mode requires a control station equipped for "data-full-duplex" operation. SDLC also supports the normal "data-half-duplex" mode of operation.  
  
The 8101, 8130 or 8140 will communicate as a control station to 3274-51C, 3276, (Canada only > 3602, < ) (Except Canada > 4701, < ) and 8775 tributary stations in "data-half-duplex" mode.  
  
Finally, these SDLC DTEs, when attached to a network via the CCITT X.21 interface (as noted), will communicate with other SDLC DTEs attached to the same network via a CCITT X.21bis (Canada only > (EIA RS-232-C) < ) (Except Canada > (V.24/V.28) < ) interface feature. See facilities M3, M4 and M5 in Chart M for information on DTEs attachable via a CCITT X.21bis interface feature.
3. The "X" in the #969X specify code denotes the line position on the 4331 or 4361 to which the SDLC protocol will be assigned. See the M4331 or 4361 pages for details. Note: On the 4361, specify codes #967X and #969X are not required.
4. The 8101 will operate at this speed only when it is installed in conjunction with an 8140 A or B or when the 8140 C does not contain #1610-#1614 or with an 8150 without ports 1-4 and 9-12.
5. The 3710 will attach to the following networks via Support N.  
Australia: DDS  
Japan: DDC
6. The 8815 does not support the DATEX-L network in Austria.

**MACHINES**

7. The 3276-11, 14, 3705-II, 3705-81, 82, 84, 3776-1, 2, 3, 4, 3777-1, 3, 4, 4331, 6360, 6580, 8101, 8130, 8140A, B, C, 8150 and the 8815-1 do not support the KILOSTREAM service in the UK.
8. The 3725 and 3726 attachment to KILOSTREAM is allowed under the following conditions:

- 3725 microcode level EC873053 or higher
- KILOSTREAM line is declared a "FULL DUPLEX" facility in the NCP generation
- X.21 interface circuit C must be tied to I by using an IBM stub cable, P/N 9993274, available from IBM Direct. For additional information refer to the appropriate UK CEPP bulletin.

## 2700 CHART P - PUBLIC PACKET SWITCHED NETWORKS

### CHART P - PUBLIC PACKET SWITCHED NETWORKS

**Note:** This chart is for Public Packet Switched Networks providing a CCITT X.21bis (Canada only) (EIA RS-232-C or CCITT V.35) < (Except Canada) (CCITT V.24/V.28 or V.35) < interface. Note: See Chart P1 for list of country networks supported.

For each machine type, the special features required for attachment are shown.

#### FACILITY P3

Synchronous operation at 2400 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

- 3274-1C, 31C, 41C, 51C, 61C: #3701 and #6302 (2) or #6303 (7)
- 3274-21C: #3701 and #6302 or #6303 (2)
- 3276-1, 4: #3701, #6302 and #6315 (2)
- 3276-11, 14: #3701, #6302 and #9491 or #9490 (2)
- 3602: #3701 and #4502 or #6302 (2)
- 3651-25, 50, 75: #9121 or #9122 (2)
- 3651-60: No special feature required (2)
- 3684: #3701 and #9822 (2)
- 3705-II: #4714 (3)
- 3705-80: No special feature required (3)
- 3710: #7001 (18) or #7005 (18)
- 3725-1, 2, 3726: #4911 (3)
- 3771, 3774, 3775: #1481 and #3701 (2)
- 3776-1, 2, 3777-1, 2: #1481 and #3701 (2)
- 3776-3, 4, 3777-3, 4: #3701 (2)
- 4331, 4361: #1601, #3701, #4695 and #969X (4, 13)
- 4701-1, 2, 3: No special feature required (9)
- 4702: No special feature required (9)
- 4952, 4954, 4955, 4956: #2090 (10)
- 5251-2: #3701 (2)
- 5251-12: #3701 (11)
- 5285, 5288: #3701, #9753 and #9482 (2)
- 5294-1: #3701 and #5680
- 5340: #2500 and #3701 (2, 5)
- 5360: #3701, #4500, #4501, and #5680; or #4550 and #4552 (14)
- 5362: #2915 and #2920
- 5364: #6060, #6051 and #6057
- 5381, 5382: #1521 and #56XY and/or #56XY, and #96XX and/or #96XX (16, 17)

- I -- 8101, 8130, 8140, 8150: #3701 and #1602 (18)

- 9373, 9375, 9377: #6030, #6031

#### FACILITY P4

Synchronous operation at 4800 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

- 3274-1C, 31C, 41C, 51C, 61C: #3701 and #6302 (2) or #6303 (7)
- 3274-21C: #3701 and #6302 or #6303 (2)
- 3276-1, 4: #3701, #6302 and #6315 (2)
- 3276-11, 14: #3701, #6302 and #9491 or #9490 (2)
- 3602: #3701 and #4502 or #6302 (2)
- 3651-25, 50, 75: #9124 or #9125 (2)
- 3651-60: No special feature required (2)
- 3684: #3701 and #9823 (2)
- 3705-II: #4714 (3)
- 3705-80: No special feature required (3)
- 3710: #7001 (18) or #7005 (18)
- 3725-1, 2, 3726: #4911 (3)
- 3771, 3774, 3775: #1481 and #3701 (2)
- 3776-1, 2, 3777-1, 2: #1481 and #3701 (2)
- 3776-3, 4, 3777-3, 4: #3701 (2)
- 4331, 4361: #1601, #3701, #4695 and #969X (4, 13)
- 4701-1, 2, 3: No special feature required (9)
- 4702: No special feature required (9)
- 4952, 4954, 4955, 4956: #2090 (10)
- 5251-2: #3701 (2)
- 5251-12: #3701 (11)
- 5285, 5288: #3701, #9754, and #9482 (2)
- 5294-1: #3701 and #5680
- 5340: #2500 and #3701 (2, 5)
- 5360: #3701, #4500, #4501, and #5680; or #4550 and #4552 (14)
- 5362: #2915 and #2920
- 5364: #6050, #6051 and #6057
- 5381, 5382: #1521 and #56XY and/or #56XY, and #96XX and/or #96XX (16, 17)
- I -- 8101, 8130, 8140, 8150: #3701 and #1602 (18)
- 9373, 9375, 9377: #6030, #6031

**FACILITY P5**

Synchronous operation at 9600 bps on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

- 3274-1C, 31C, 41C, 51C, 61C: #3701 and #6302 (2) or #6303 (7)
- 3274-21C: #3701 and #6302 or #6303 (2)
- 3276-1, 4: #3701, #6302 and #6315 (2)
- 3276-11, 14: #3701, #6302 and #9491 or #9490 (2)
- 3602: #3701 and #4502 (2)
- 3705-II: #4714 (3)
- 3705-80: No special feature required (3)
- 3710: #7001 (18) or #7005 (18)
- 3725-1, 2, 3726: #4911 (3)
- 3776-1, 2, 3777-1, 2: #1481 and #3701 (2)
- 3776-3, 4, 3777-3, 4: #3701 (2)
- 4331, 4361: #1601, #3701, #4695 and #969X (4, 13)
- 4701-1, 2, 3: No special feature required (9)
- 4702: No special feature required (9)
- 4952, 4954, 4955, 4956: #2090 (10)
- 5251-2: #3701 (2)
- 5251-12: #3701 (11)
- 5294-1: #3701 and #5680
- 5340: #2500 and #3701 (2, 5)
- 5360: #3701, #4500, #4501, and #5680; or #4550 and #4552 (14)
- 5362: #2915 and #2920
- 5364: #6050, #6051 and #6057
- 5381, 5382: #1521 and #56XY and/or #56XY, and #96XX and/or #96XX (16, 17)
- 8101, 8130, 8140, 8150: #3701 and #1602 (18)
- 9373, 9375, 9377: #6030, #6031

**FACILITY P6**

Synchronous operation at speeds (Canada only > up to 56K bps <) (Except Canada > up to 48K bps <) on a public packet switched network via a CCITT X.21bis stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

- 3705-II: #4726 (8)
- 3705-80: #6712 and #9713 (8)
- 3710: #7005 (18)
- 3725-1, 2, 3726: #4931 (8)
- 4952, 4954, 4955, 4956: #2080 (12)

**-- Notes for Chart P**

1. Contact IBM for more information on these facilities, including attachable DCEs, required options, etc.
2. Attachment of these DTEs to this facility is via a 5973-L02 Network Interface Adapter. For more information on this adapter, see RPQ Y96635.
3. The 3705-II, the 3705-80, and the 3725-1, 2, 3726 require either the Program Product 5668-981 or the 5973-L02 Network Interface Adapter for operation on this facility.
4. The "X" in the specify code #969X specifies in which line position on the 4321 or 4331 this protocol is to be installed. See the M4321 or 4331 pages for details.
5. The listed feature codes are for the attachment of a single communication line to the 5340. A second line may be attached to a 5340 equipped with #3500. See the M5340 pages for details.
6. The "X" in the 5381 specify code denotes the line position to which this speed will be assigned. See the M5381 pages for details.
7. The 3274-1C, 31C, 41C, 51C and 61C require either Configuration Support P or Configuration Support D, Release level 50.1 or 63.1, for operation on this facility; or attachment may be via the 5973-L02 Network Interface Adapter.
8. The 3705-II, 3705-80, 3725-1, 2 and 3726 require Program Product 5668-981 for operation on this facility. The 3705-II with CBS2 and the 3705-80 support speeds up to 20.4K bps only.
9. The 4701-1 and 2 require either the X.25 feature or the 5973-L02 Network Interface Adapter for operation on this facility.
10. The 4956 requires either Program Product 5719-HD2 or the 5973-L02 Network Interface Adapter for operation on this facility. The 4954, 4955, 4956, 4959 and 4965 require either Program Product 5719-HD1, Program Product 5719-HD2 or the 5973-L02 Network Interface Adapter for operation on this facility. Two 2090 features are required per attachment to the network. The 2090 feature may be installed in the 4959 or 4965 expansion unit. Note: In Chart P1 only the 4956 is shown but all the above machines types are supported.
11. The 5251 M12 requires either RPQ 8D0072 or the 5973-L02 Network Interface Adapter for operation on this facility.
12. The 4956 requires program product 5719-HD2 for operation on this facility. The 4954, 4955 and 4956 require either Program Product 5719-HD1 or Program Product 5719-HD2 for operation on this facility. One 2080 feature is required per attachment to the network. The 2080 feature may be installed in the 4959 or 4965 expansion unit. Note: In Chart P1 only the 4956 is shown but all the above machine types are supported.
13. The 4361 requires either ACF/VTAM Version 2 Release 1 or the 5973-L02 Network Interface Adapter for operation on this facility. The 4331 support is by the 5973 L02 Network Interface Adapter.
14. The #92XX specify code designates the second line used for X.25 (see M5360 pages for details on specify codes).
15. Ignore this note.
16. The X in the #56XY feature code specifies whether the line connector cable is V.24 (or EIA equivalent), V.35, or V.21 type. The Y in the #56XY feature code specifies line position.  
  
The XX in the #96XX feature code specifies the length of the external cables. See M5381/5382 pages for details.
17. The 5381/5382 may also be attached to this facility via a 5973 L02 network interface adapter. Special features required for attachment are #3701 and #922X. See notes 2 and 6.  
  
The 3710 is supported for attachment to the following networks:

Argentina - ARPAC  
Australia - AUSTPAC  
Brazil - RENPAC  
Canada - DATAPAC  
Korea - DATACOM-NET  
Mexico - TELEPAC  
New Zealand - NZPO  
Singapore - TELEPAC

Taiwan - PACNET

18. The 8101, 8130, 8140 and 8150 attachment is by Program Product DPPX Release 3 (5660-281) or the 5973 L02 Network Interface Adapter.

Chart P1: The following chart presents the countries in which each product is supported.

Country-Network	3	3	3	3	3	3	4	4	4	9	5	5	5	5	5	5	8
	1	2	7	7	7	7	7	7	7	3	3	9	2	2	3	3	3
	7	7	0	1	2	2	0	0	6	7	5	5	9	6	6	8	7
	4	4	5	0	0	5	1	2	1	0	6	1	4	0	2	1	2
Argentina-ARPAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Australia-AUSTPAC	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y
Brazil-RENPAC	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N
Canada-DATAPAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Canada-INFOSWITCH (CCITT 80)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Hong Kong-DATAPAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
Hong Kong-INTELPAC	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y
Japan-DDX-P	N	N	Y	N	Y	Y	N	N	N	Y	N	Y	Y	Y	Y	Y	N
Japan-DDX-P (1980)	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	N
Japan-VENUS	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	N
Korea-DACOM-NET	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Malaysia-MAYPAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Mexico-TELEPAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
New Zealand-NZPO	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Singapore-TELEPAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
Taiwan-PACNET	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N

Y = Attachment is supported by the product

N = Attachment is NOT supported by the product

-- Notes:

1. The 5360, 5362, 5381, 5382, and 5294 require the use of the ELLC protocols when attached to the DDX-P network in Japan. This does not apply to DDX-P (1980).

2. The 5294 support of the DDX-P network in Japan is for Permanent Virtual Circuits only. This does not apply to DDX-P (1980).

3. Program Product (5668-981) support for the DDX-P network in Japan Releases 2.0, 3.0, 3.1 and 4.0 and requires a Small Programming Enhancement (SPE). Releases 3.2, 4.1 and 4.2 do not require the SPE.

4. For 8100 availability for support of DDX-P (1980) contact the  
IBM Telecommunication Representative.

## 2700 CHART Q - PUBLIC PACKET SWITCHED NETWORKS

### CHART Q - PUBLIC PACKET SWITCHED NETWORKS

**Note:** This chart is for Public Packet Switched Networks providing a CCITT X.21 interface.

For each machine type, the special features required for attachment are shown.

See Table A for country networks supported.

**5360:** #4500, #4501, #5655, and #5680, or #4550 and #4554 (4)

**5362:** #2915, #2954

**5381, 5382:** #1521, #562X, and #961X (9)

**9373, 9375, 9377:** #6030, #6031

### FACILITY Q3

Synchronous operation at 2400 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

**3274-1C, 31C, 41C, 51C, 61C:** #6303 and #5655 (8)

**3705-II:** #5655 and #9842 (2)

**3705-81, 82:** #5657 and #9777 (2)

**(Except Canada > 3705-84:** (2, 3) <)

**3710:** #7010 (10)

**3725-1, 2, 3726:** #4941 (2)

**4331, 4361:** #1601, #4695, #5655, and #969X (5)

**4701-1, 2:** #5655

**4952, 4954, 4955, 4956:** #2080 (7)

**5294-1:** #5655 and #5680

**5360:** #4500, #4501, #5655, and #5680, or #4550 and #4554 (4)

**5362:** #2915, #2954

**5381, 5382:** #1521, #562X, and #961X (9)

**9373, 9375, 9377:** #6030, #6031

### FACILITY Q4

Synchronous operation at 4800 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

**3274-1C, 31C, 41C, 51C, 61C:** #6303 and #5655 (8)

**3705-II:** #5655 and #9842 (2)

**3705-81, 82:** #5657 and #9777 (2)

**(Except Canada > 3705-84:** (2, 3) <)

**3710:** #7010 (10)

**3725-1, 2, 3726:** #4941 (2)

**4331, 4361:** #1601, #4695, #5655, and #969X (5)

**4701-1, 2:** #5655

**4952, 4954, 4955, 4956:** #2080 (7)

**5294-1:** #5655 and #5680

### FACILITY Q5

Synchronous operation at 9600 bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

**3274-1C, 31C, 41C, 51C, 61C:** #6303 and #5655 (8)

**3705-II:** #5655 and #9842 (2)

**3705-81, 82:** #5657 and #9777 (2)

**(Except Canada > 3705-84:** (2, 3) <)

**3710:** #7010 (10)

**3725-1, 2:** #4941 (2)

**4331, 4361:** #1601, #4695, #5655, and #969X (5)

**4701-1, 2:** #5655

**4952, 4954, 4955, 4956:** #2080 (7)

**5294-1:** #5655 and #5680

**5360:** #4500, #4501, #5655, and #5680, or #4550 and #4554 (4)

**5362:** #2915, #2954

**5381, 5382:** #1521, #562X, and #961X (9)

**9373, 9375, 9377:** #6030, #6031

### (EXCEPT CANADA > FACILITY Q6

Synchronous operation at speeds up to 48K bps on a public packet switched network via a CCITT X.21 stand-alone DCE complying with CCITT Recommendation X.25 as it is delineated in GA27-3345. (1)

**3705-II:** #5655 and #9842 (2)

**3705-81, 82:** #5658 and #9778 (2)

**3705-84:** (2, 3)

**3710 <):** #7010 (10)

**(Except Canada > 3725-1, 2, 3726:** #4942 (2)

**4952, 4954, 4955, 4956:** #2080 (7)

**5381, 5382:** #1521, #562X, and #961X (9)

**5294-1:** #5655 and #5680 <)

### Notes for Chart Q:

1. Contact IBM for more information on attachable DCEs, services, etc.
2. The 3705 and the 3725-1, 2, 3726 require program product 5668-981 for operation on this facility. A 3705 or a 3725-1, 2, 3726 attached to a network via a CCITT X.21 interface (as

- noted) may communicate with other DTEs attached to the same network via a CCITT X.21bis interface. See facilities P3, P4, P5 and P6 in Chart P for information on the attachment of DTEs to a network via the CCITT X.21bis interface.
3. No special feature is required. Specify #9777 for nonswitched operation at 2400 bps, 4800 bps or 9600 bps. Specify #9778 for nonswitched operation at 48K bps.
  4. The #92XX specify code designates the line on which X.25 is installed (see M5360 pages for details on specify codes).
  5. The "X" in the specify code 969X specifies in which line position on the 4331 this protocol is to be installed. See the M4331 pages for details.
- The 4331 models 2 and 11 and 4361 require ACF/VTAM Version 2 Release 1 (5666-280). The 4331 also requires RPQ 7B0756.
6. Ignore this note.
  7. The 4956 requires Program Product 5719-HD2 for operation on this facility. The 4954, 4955, and 4956 require either Program Product 5719-HD1 or Program Product 5719-HD2 for operation on this facility. One 2080 feature is required per attachment to the network. The 2080 feature may be installed in the 4959 or 4965 expansion unit. In Table A only the 4956 is shown but all the above machine types are supported.

8. The 3274 models 1C, 31C, 41C, 51C, and 61C require either Configuration Support P or Configuration Support D, Release Level 50.1 or 63.1 for operation on this facility.
9. The X in the #562X feature code specifies line position and the X in the #961X feature code specifies cable length. See M5381/5382 pages for details. X means this network is supported by the product.

Table A	3	3	3	4	4	4	4	5	5	5
	2	7	7	3	3	7	9	2	3	3
	7	0	2	3	6	0	5	9	6	6
	4	5	5	1	1	1	6	4	0	2
-----	-	-	-	-	-	-	-	-	-	-
Japan-DDX-P							X			

10. The 3710 is supported for attachment to the following networks.
  - Argentina - ARPAC
  - Australia - AUSTPAC
  - Brazil - RENPAC
  - Canada - DATAPAC
  - Korea - DATACOM-NET
  - Mexico - TELEPAC
  - New Zealand - NZPO
  - Singapore - TELEPAC
  - Taiwan - PACNET

## 3044 FIBER OPTIC CHANNEL EXTENDER LINK

### PURPOSE

Provides for the extension of the allowable channel cable length for low-to-medium speed I/O control units, up to additional 2km (6,600 ft) with fiber optic cables.

### MODELS

**Model C01:** Link - Channel Unit

**Model D01:** Link - Downstream Unit

**Limitations:** Remote power sequencing is not implemented through the 3044.

Attachment to block multiplexer channels is preferred. (See "IBM 3044 Fiber Optic Channel Extender Link Product Description", GA22-7097, for channel considerations.)

**Warranted Specifications:** The 3044 is designed according to "IBM S/360 and S/370 I/O Interface Channel to Control Unit (OEMI)", GA22-6974, except as set forth in "IBM 3044 Fiber Optic Channel Extender Link Product Description", GA22-7097.

**Maximum Configuration:** Multiple C01 units are permitted on a channel and up to 8 control units can be added to each D01 unit. The C01 unit does not have a control unit address associated with it, but electrically occupies the equivalent of one control unit and must be taken into account when configuring the system. (See "IBM 3044 Product Description", GA22-7097, for any limitations that may apply).

**Prerequisites:** Link units must be interconnected by fiber optic cable (pairs) provided and installed by the customer in accordance with IBM specifications.

ECs #212267 (hardware) and #213219 (microcode) will be required for 3088 MCCUs utilizing the 3044 in data-streaming mode.

EC #331258 is required for 3800 mdl 3 printers utilizing the 3044 in data streaming mode.

Additional S/370 System I/O Interface bus and tag cables will be required for the installation of the 3044 and must be acquired by the customer.

### HIGHLIGHTS

The C01 and D01 units serialize and de-serialize the parallel data received from the channel and downstream devices via bus and tag cables.

Serialized data is processed between the C01 and D01 units via a dual fiber optic cable up to 2km (6,600 ft) apart.

No modifications of operating system or user programs are required when introducing the 3044 into the system.

Data streaming rates up to 1.250M bytes/sec or DC Interlock rates up to 43K bytes/sec are attainable at 2km (6,600 ft).

The 3044 supports two devices in data streaming mode: the 3088 with EC #212267 and EC #213219, at 1.125M bps and the 3800 mdl 3 printer with EC #331258, at 1.25M bps.

In conjunction with an IBM 3088 Multisystem Channel Communication Unit mdls 1 or 2 and a Processor Concentrator (e.g., 43XX), unique and versatile terminal installations are possible.

**System Attachment:** The 3044 is attachable to 4331, 4341, 4361, 4381, 3031, 3032, 3033, 3042 Attached Processor mdl 2, 3081, 3083, 3084, 3090, 9370 processors. Limitations: The 9370 supports only the 4381 CTC Adapter via the 3044.

### Downstream Attachable Devices \*:

Printers	CU
3800-1	
3800-3	
3203-5	
3211-1	3811-1
3262-5	
3268-2	3174(01L)/3274 (A, B & D)
3287	3174(01L)/3274 (A, B & D)
4250	3174(01L)/3274 (A, B & D)
4245	
4248	

Card Rdrs/ Punches	CU
3505/B1, B2	
3525	3505

Displays	CU
3178	3174(01L)/3274 (A, B & D)
3179	3174(01L)/3274 (A, B & D)
3180	3174(01L)/3274 (A, B & D)
3277	3174(01L)/3274 (A, B & D)
3278	3174(01L)/3274 (A, B & D)
3279	3174(01L)/3274 (A, B & D)
3290	3174(01L)/3274 (A, B & D)
5150	3174(01L)/3274 (A, B & D)

w/3279 feature	
3251 via	
3255	5088, 3258
5081 via	
5085	5088
5083 via	
5081/5	5088
6580/3270	
Feature	3174(01L)/3274 (A, B & D)

Magnetic/Optical Character Reader  
3890

Switches  
2914 Switch  
3814 Switching Management System

Other Devices \*  
3088 Multisystem Channel  
Communication Unit Series/1  
(with IBM Channel Attach Feature  
#1200)  
3705  
3720  
3721  
3725  
7171  
DACU (7170)  
CTC Adapter

\* See "3044 Product Description Manual", GA22-7097, for limitations.

### Publications:

- "IBM 3044 Fiber Optic Channel Extender Link Product Description" GA22-7097
- "IBM 3044 Fiber Optic Channel Extender Link Fiber Optic Cable Planning and Installation Guide" GC22-7073
- "IBM 3044 Fiber Optic Channel Extender Link Customer Problem Determination Guide" (Shipped with machine group) SA22-7099

- TNL to "System 370 I/O Installation Manual" GN22-2322 and "Physical Planning Guide", GC22-7064.

**SPECIFY**

- (Canada only) > Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0m (10 ft) power cable, nonlocking plug (no specify code required). < )
- (Except Canada) > Power (AC, 1-phase, 3-wire): 3.0m (10 ft) power cable.

50 or 60 Hz  
110 - 127V #0802  
200 - 240V #0801< )

The 3-digit country code is used to select a power cord, plug, and safety labels which meet the requirements of that country.

- Language Groups:

Canadian	
French #2935	German #2929
English #2924	Spanish #2931
French #2928	

If one of the above is not specified, the language group will be in English.

- Color: The standard color for this unit is pearl white.

**SPECIAL FEATURES (NONE)****MODEL CONVERSIONS (NONE)****ACCESSORIES (PURCHASE ONLY)**

**Jumper Cables (P/N 5454624):** IBM 3044 Fiber Optic Channel Extender Jumper Cables (or equivalent) are required for product attachment either alone or in conjunction with an installed fiber optic network trunk installation (to IBM specifications). Jumper cables can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cables and associated accessories. Refer to "IBM 3044 Fiber Optic Channel Extender Link - Fiber Optic Cable Planning and Installation Guide", GC22-7073, for installation requirements and details.

**Standard Length Jumper Cables** (Assembly P/N 5454624) factory-connected. Standard lengths available: 20, 40, 75, 100, 150, 200, 250, 300 and 350 ft. Indicate cable length on order.

**Custom Length Jumper Cables** (Assembly P/N 5454624) Factory-connected. Available in 5 ft increments from 5 ft to 1,650 ft. Indicate cable length on order.

Order the above items via MES from Poughkeepsie. Specify Assembly P/N and length of jumper cable. Allow a lead time of 8 weeks for standard length and 12 weeks for customer length.!

**Notes:**

1. Standard jumper cable lengths are off-the-shelf. Custom jumper cable lengths require additional lead times.
2. If the order specifies a length other than a standard length, a custom length will be provided.
3. Refer to AAS GSLM file for price information.
4. MMC not applicable for jumper cables.

**SUPPLIES (NONE)**

## 3081 PROCESSOR UNIT

### PURPOSE

Provides arithmetic, logic and control function through two integrated central processors and houses shared central storage and channels for a 3081 Processor Complex.

### MODELS

Models		Bytes of Central Storage
D16	G16*	16,777,216
D24	G24*	25,165,824
D32	G32*	33,554,432
	G48*	50,331,648
	G64*	67,108,864
	K16*	
	K24*	
	K32*	
	K48*	
	K64*	

\* Model Group G and K are no longer available. Features, Model Conversions, RPQs and Accessories are available.

**Note:** At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. A maximum of 4080 devices is possible.

**Limitations:** In 370 mode, address translation is limited to 64K byte segments and 4K byte page size (except mdl D16, which translate 2K or 4K byte page size.) In 370 mode, mdl D16 uses 2K storage protect keys, while all other models use 4K storage protect keys.

**Prerequisites:** Each 3081 Processor Unit requires:

1. One 3082 Processor Controller,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400 Hz power source.

**Note:** Depending upon the 3081 mdl, #9491, #9492, or #9493 must be specified on the 3082 Processor Controller. See "Specify" in M3082 pages.

Those customers using the 3087 mdl 1 CDU to cool their systems, must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

### HIGHLIGHTS

Depending upon the mdl, contains up to 67,108,864 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... two integrated central processors having a cycle time of 26 nanoseconds ... eight byte data flow between each processor and storage ... each processor has its own high-speed buffer ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM/SP High Performance Option ... extensive data checking.

**Standard Features:** S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist ... Start Interpretive Execution (SIE) Assist (not available on model D) ... S/370-XA Sorting Assists.

**Channels:** The External Data Controller (EXDC) is an integrated I/O processor containing 16 channels organized in two groups of eight. An additional group of eight channels is available as an optional feature. Channels are configurable as either byte or block multiplexer channels.

A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, either central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 24 channel paths to which the device is attached.

**Bibliography:** GC20-0001.

### SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify #9491.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying #9571. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying #9572. Specify either #9571 or #9572 as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning*, GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2500 lbs and may require partial depopulation of 3081 frames to frames to satisfy this limitation. Specify #9581 to reduce frame weights to less than 1,136kg/2,500 lbs.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

### SPECIAL FEATURES

**Channel Group Add'l (#1550):** Provides an add'l group of eight block multiplexer channels. **Prerequisites:** Every #1550 requires support from a 3082 Processor Controller mdl 24. **Limitations:** #1550 may be configured only as block multiplexer channels. **Maximum:** One. **Field Installation:** Yes.

**Performance Feature (#4010):** Improves performance by reducing the cycle time to 24.5 nanoseconds. **Limitations:** Not available on Model D. **Field Installation:** Yes. **Prerequisites:** #4020 on the 3082 Processor Controller. **Note:** Customer Purchase Agreement Supplement must show, "Installation of this feature involves removal of parts which become the property of IBM."

### MODEL CONVERSIONS

Model upgrades from model Ds and Gs to model Ks or model upgrades increasing storage capacity are field installable and the parts removed or replaced become the property of IBM and must be returned. Model downgrade from model Ks to model Ds are not available. Model

**3081 Processor Unit (cont'd)**

downgrade from a 3081 model G or K to a 3083 is not recommended. Model conversion from 3081 to 3081 Improved Models is not available. **Note:** Any 3081-K upgrades to a 3084-Q requires installation of feature #1550 (Channel Group Add'l) on the 3081-K as a prerequisite to upgrading. Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES. See M3084 pages for 3081-K to 3084-Q upgrade.

**ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3081 Processor Complex.

**Console Table, 308X Processor Complex (#1560):** Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	<b>#9441</b>	Sunrise Yellow	<b>#9163</b>
Left end attachment	<b>#9442</b>	Classic Blue	<b>#9164</b>
		Charcoal Brown	<b>#9165</b>
Willow Green	<b>#9161</b>	Pebble Gray	<b>#9166</b>
Garnet Rose	<b>#9162</b>	Pearl White	<b>#9167</b>

**SUPPLIES (None)**

## 3081 PROCESSOR UNIT (IMPROVED MDLS)

### PURPOSE

Provides arithmetic, logic and control function through two integrated central processors and houses shared central storage and channels for a 3081 Processor Complex.

### MODELS

Models	Bytes of Central Storage
GX1 KX1	16,777,216
GX2 KX2	25,165,824
GX3 KX3	33,554,432
GX4 KX4	50,331,648
GX6 KX6	67,108,864

**Note:** At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 64KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. A maximum of 4080 devices is possible.

**Limitations:** In 370 mode, address translation is limited to 64K byte segments and 4K byte page size. In 370 mode, all models use 4K storage protect keys.

**Prerequisites:** Each 3081 Processor Unit Improved Models requires:

1. One 3082 Processor Controller Improved Mdl,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400 Hz power source.

**Note:** Depending upon the 3081 Improved Mdl, #9491, #9492, or #9493 must be specified on the 3082 Processor Controller Improved Mdl. See "Specify" under 3082 Improved Mdl.

Those customers using the 3087 mdl 1 CDU to cool their systems, must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

### HIGHLIGHTS

Depending upon the mdl, contains up to 67,108,864 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... two integrated central processors having a cycle time of 24 nanoseconds ... eight byte data flow between each processor and storage ... each processor has its own high-speed buffer ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370 XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM/SP High Performance Option ... extensive data checking.

**Standard Features:** S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist ... Start Interpretive Execution (SIE) Assist ... S/370-XA Sorting Assists.

**Channels:** The External Data Controller (EXDC) is an integrated I/O processor containing 16 channels organized in two groups of eight. An additional group of eight channels is available as an optional feature. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data

streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, either central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 24 channel paths to which the device is attached.

**Bibliography:** GC20-0001.

### SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify #9491.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying #9571. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying #9572. Specify either #9571 or #9572 as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning*, GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2500 lbs and may require partial depopulation of 3081 Improved Mdl frames to satisfy this limitation. Specify #9581 to reduce frame weights to less than 1,136kg/2,500 lbs.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller Improved Mdl.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

### SPECIAL FEATURES

**Channel Group Add'l (#1550):** Provides an add'l group of eight block multiplexer channels. **Prerequisites:** Every #1550 requires support from a 3082 Processor Controller mdl X24. **Limitations:** #1550 may be configured only as block multiplexer channels. **Maximum:** One. **Field Installation:** Yes.

### MODEL CONVERSIONS

Model upgrades from model GXs to model KXs or or model upgrades increasing storage capacity are field installable and the parts removed or replaced become the property of IBM and must be returned. Model downgrades from model KXs to GXs, or downgrades from 3081 Improved Models to 3081, 3083, 3083 Improved Models are not available. **Note:** Any 3081-KX upgrades to a 3084-QX requires installation of feature #1550 (Channel Group Add'l) on the 3081-KX as a prerequisite to upgrading. Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES. See M3084 pages for 3081-KX to 3084-QX upgrade.

**3081 Processor Unit (Improved Mdl's) (cont'd)****ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3081 Processor Unit Complex (Improved Models).

**Console Table, 308X Processor Complex (#1560):** Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	<b>#9441</b>	Sunrise Yellow	<b>#9163</b>
Left end attachment	<b>#9442</b>	Classic Blue	<b>#9164</b>
		Charcoal Brown	<b>#9165</b>
Willow Green	<b>#9161</b>	Pebble Gray	<b>#9166</b>
Garnet Rose	<b>#9162</b>	Pearl White	<b>#9167</b>

**SUPPLIES (None)**

**MACHINES**
**3082 PROCESSOR CONTROLLER**
**PURPOSE**

Provides the controlling mechanism for monitoring and supervising either the 3081, 3083, or 3084 Processor Complex and houses the interface adapter elements for each channel. It also contains the adapters for attaching the 3278-2A Display Console, an optional 3287 Printer and an optional 3268-2, a 3230-2 or a 3278-2 Display Station (programming support console). **Note:** The 3082 model Q48 is not orderable from the plant and can only be achieved by upgrading a 3082 model 24.

**MODELS**

<b>Model 8</b>	008	[NO LONGER AVAILABLE]* Supports 3083 Processor Units with 8 channels.
<b>Model 16</b>	016	Supports 3081 or 3083 Processor Units with 16 channels.
<b>Model 24</b>	024	Supports 3081 or 3083 Processor Units with 24 channels.
<b>Model Q48</b>	Q48	Supports a 3084 having 24 channels per side. (Available by MES only.)

\* Features, Model Conversions, RPQs and Accessories are not affected.

**HIGHLIGHTS**

The 3082 provides the machine to human interface for either the 3081, 3083, or 3084 Processor Complex and performs the following: Provides the control unit function for the system console ... provides the control unit function for an integrated service support console ... provides the control unit function for an optional printer and a programming support console ... houses the interface logic and control for each channel ... houses basic switches, lights and indicators ... houses the remote service facility modem used in remote servicing ... contains a diskette drive for maintenance data interchange ... contains fixed media direct access storage for processor data ... monitors power levels and coolant flow ... controls usage configurations and effects reconfiguration ... at initial microcode load, controls microcode loading of distributed control stores ... assist the Processor Unit in error recovery ... provides access to RETAIN for a 3278 Model 2 Display Station with or without Switch Control Unit feature (#1720) ... performs basic diagnostic and failure isolation on a time sharing basis with the above functions and operates concurrently to the processor unit to which it attaches.

One 3082 is required for each 3081, 3083, or 3084 Processor Unit. Each side of a 3082 Model Q48 has the functional attributes of model 24 plus the ability to function in a multiprocessor configuration.

**3084 Operation:** A 3082-Q48 is required to support any 3084 Processor Complex and contains two Monitoring and System Support Facilities (MSSF). Like the 3084 with which it functions, the 3082-Q48 duplicates most hardware, including two MSSFs. In a single image configuration, one MSSF supervises the 3084 Processor Complex. The second MSSF is capable of automatically assuming supervision of a 3084 Processor Complex for most failures of the primary MSSF.

At the failure of any critical hardware element, the MSSF performs its normal identification of failing componentry but also continues to supervise non-failing elements. This permits the operator to vary-off failing elements and to establish a maintenance configuration so that the failing hardware may be repaired. Using the intercommunication capability between the MSSF and the control program, pages are relocated where necessary and fencing is established between the maintenance configuration and the continuing customer's configuration. Upon verification of repair, the maintenance configuration is eliminated, the operator may vary-on the now repaired hardware and return it to continuing configuration.

When the 3084 is partitioned into two configurations, each side of the processor complex functions independently under the supervision of a dedicated MSSF.

**Limitations:** Natively attached programming support consoles (3278-2) must have installed a 75-key EBCDIC typewriter keyboard #4621 and specify feature #2956 (English US keyboard language).

**SPECIFY**

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800

400V #2825  
415V #2826

240V #9915

- Processor Unit Attachment:

**3081**

any Model D = #9491  
any Model K = #9492  
any Model G = #9493

**3083**

any Model E = #9497  
any Model B = #9498  
any Model J = #9499

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.

- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame E and L are 945mm wide by 1778mm long by 1790mm high (37.2" x 70" x 70.5"). Should shipping dimensions need reduction, the side covers may be removed, reducing external dimensions to 858mm wide by 1778mm long (33.8" x 70"). This reduction may be obtained by specifying #9571. Further reduction may be achieved by additionally removing a frame extension which reduces external dimensions to 858mm x 1550mm (33.8" x 61") and is obtainable by specifying #9573. Specify #9571 and #9573 as required. For additional information, see *IBM System/370 Installation Manual Physical Planning*, GC22-7004, and/or your Installation Planning Representative.

- Remote Servicing: A customer supplied data communication line with an exclusion key telephone (Canada only) of the WE503 or 2503 type (or equivalent) and a manual answer Data Protective Coupler (CDT type or equivalent) is necessary in order that higher level support may be received from the Field Support Center. These same facilities may also be used with RETAIN. The capability of using the RETAIN remote service/logout analysis is standard.

An integrated remote service facility modem (Except Canada) or alternatively, an interface to an external modem is standard on 3082 and (except for Canada and Japan) will be provided for automatically by country code at the time of order. For Japan, specify #2948 and #2943 to obtain an internal modem with test connectors, or #3701 for an external modem (CCITT V.24). Connection of the IBM provided telephone interface cable to the telephone network must be arranged for by the customer. Each side of the 3082-Q48 has a remote service facility modem. When ordering Q upgrades, above specify codes must be shown where required.

- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.
- Remote 3278-2A Display Console: The standard cable for interconnecting the 3082 and the 3278-2A (system console) is a fixed length, 15 meter (49 feet) cable. Cables greater than 15 meters (49 feet), up to the maximum length of 1,500 meters (4,921 feet), may be obtained by RPQ 8P0891 (refer to HONE for description and order information).

**SPECIAL FEATURES**

**Channel To Channel Adapter (#1850 For First, #1851 For Second):** Provides the controlling element to interconnect two processors via their channels (either S/360 or S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. On Model Q48, the feature is located on the A-side. **Maximum:** Two, one #1850 and one #1851. **Field Installation:** Yes. **Prerequisites:** #1851 requires #1850.

**B-side CTC Adapter (#1852 for third, #1853 for fourth):** [Mdl Q48] Provides the controlling element to interconnect two processors via their channels (either S/360, S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. Feature is located on the B-side of the 3082. **Limitations:** Mdl Q48 only. **Maximum:** Two, one #1852 and one #1853. **Field Installation:** Yes. **Prerequisites:** #1853 requires #1852.

**Performance Feature (#4020):** Improves performance by reducing the cycle time to 24.5 nanoseconds. (On a Q48, the feature is located on the A-side.) **Field Installation:** Yes. **Prerequisites:** #4021 on a 3082-Q48. #4010 on the associated 3081/3083 Processor Unit. #4010 and #4011 on the associated 3084 Processor. **Note:** Customer Purchase Agreement Supplement must show, "Installation of this feature involves removal of parts which become the property of IBM."

**3082 Processor Controller (cont'd)**

**Performance Feature (#4021):** [Mdl Q48] Improves performance by reducing the cycle time to 24.5 nanoseconds. Feature is located on the B-side of a mdl Q48. **Limitations:** Mdl Q48 only. **Field Installation:** Yes. **Prerequisites:** #4020 on the 3082 A-side, #4010 and #4011 on the 3084. **Note:** Customer Purchase Agreement Supplement must show, "Installation of this feature involves removal of parts which become the property of IBM."

**I/O Power Sequence Control (#4650):** The 3082 has a standard capability of associating up to 32 control units to a 3081, 3083, or the A-side of a 3084 Processor Complex for power-on/power-off control purposes. When requirements exceed these 32 power control relays, #4650 provides for power-on/power-off control for the 33rd through 64th control unit. **Maximum:** One. **Field Installation:** Yes.

**B-side I/O Power Sequence Control (#4651):** [Mdl Q48] The B-side of 3082-Q48 has a standard capability of associating up to 32 control units to the B-side of the 3084 for power sequence purposes. When requirements exceed these 32 power-control relays, #4651 provides for power-on/power-off control for the 33rd through 64th control unit attached to the B-side. **Limitations:** Available only on mdl Q48. **Maximum:** One. **Field Installation:** Yes.

**MODEL CONVERSIONS**

Model upgrades are field installable. Upgrade to a model Q48 may only take place from a model 24. Model downgrade from a model Q48 to any other model is not recommended. Model upgrades, or conversions from 3082 to 3082 Improved Models are not available.

**ACCESSORIES (None)****SUPPLIES (None)**

**MACHINES**
**3082 PROC. CTRL. (IMPROVED MDLS)**
**PURPOSE**

Provides the controlling mechanism for monitoring and supervising either the 3081 Improved Models, 3083 Improved Models, or 3084 Improved Models Processor Complex and houses the interface adapter elements for each channel. It also contains the adapters for attaching the 3278-2A Display Console, an optional 3287 Printer and an optional 3268-2, a 3230-2 or a 3278-2 Display Station (programming support console).

**MODELS**

<b>Model X08</b>	X08	Supports 3083 Improved Model processor units with 8 channels.
<b>Model X16</b>	X16	Supports 3081 Improved Model or 3083 Improved Model processor units with 16 channels.
<b>Model X24</b>	X24	Supports 3081 Improved Model or 3083 Improved Model processor units with 24 channels.
<b>Model X48</b>	X48	Supports a 3084 Improved Model processor unit with 24 channels per side.

**HIGHLIGHTS**

The 3082 Improved Model provides the machine to human interface for either the 3081 Improved Model, 3083 Improved Model, or the 3084 Improved Model Processor Complex and performs the following: Provides the control unit function for the system console ... provides the control unit function for an integrated service support console ... provides the control unit function for an optional printer and a programming support console ... houses the interface logic and control for each channel ... houses basic switches, lights and indicators ... houses the remote service facility modem used in remote servicing ... contains a diskette drive for maintenance data interchange ... contains fixed media direct access storage for processor data ... monitors power levels and coolant flow ... controls usage configurations and effects reconfiguration ... at initial microcode load, controls microcode loading of distributed control stores ... assist the Processor Unit in error recovery ... provides access to RETAIN for a 3278 Model 2 Display Station with or without Switch Control Unit feature (#1720) ... performs basic diagnostic and failure isolation on a time sharing basis with the above functions and operates concurrently to the processor unit to which it attaches.

One 3082 Improved Model is required for each 3081 Improved Model, 3083 Improved Model, or 3084 Improved Model Processor Unit. Each side of a 3082 Model X48 has the functional attributes of model X24 plus the ability to function in a multiprocessor configuration.

**3084 Operation:** A 3082-X48 is required to support any 3084 Improved Models Processor Complex and contains two Monitoring and System Support Facilities (MSSF). Like the 3084 with which it functions, the 3082-X48 duplicates most hardware, including two MSSFs. In a single image configuration, one MSSF supervises the 3084 Improved Model Processor Complex. The second MSSF is capable of automatically assuming supervision of a 3084 Improved Mdl Processor Complex for most failures of the primary MSSF.

At the failure of any critical hardware element, the MSSF performs its normal identification of failing componentry but also continues to supervise non-failing elements. This permits the operator to vary-off failing elements and to establish a maintenance configuration so that the failing hardware may be repaired. Using the intercommunication capability between the MSSF and the control program, pages are relocated where necessary and fencing is established between the maintenance configuration and the continuing customer's configuration. Upon verification of repair, the maintenance configuration is eliminated, the operator may vary-on the now repaired hardware and return it to continuing configuration.

When the 3084 Improved Mdl is partitioned into two configurations, each side of the processor complex functions independently under the supervision of a dedicated MSSF.

**Limitations:** Natively attached programming support consoles (3278-2) must have installed a 75-key EBCDIC typewriter keyboard #4621 and specify feature #2956 (US English keyboard language).

**SPECIFY**

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):

<b>50 Hz</b>	<b>60 Hz</b>
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Processor Unit Attachment:

**3081**

any mdl KX = #9492  
any mdl GX = #9493

**3083**

any mdl CX = #9496  
any mdl EX = #9497  
any mdl BX = #9498  
any mdl JX = #9499

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.

- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame E and L are 945mm wide by 1778mm long by 1790mm high (37.2" x 70" x 70.5"). Should shipping dimensions need reduction, the side covers may be removed, reducing external dimensions to 858mm wide by 1778mm long (33.8" x 70"). This reduction may be obtained by specifying #9571. Further reduction may be achieved by additionally removing a frame extension which reduces external dimensions to 858mm x 1550mm (33.8" x 61") and is obtainable by specifying #9573. Specify #9571 and #9573 as required. For additional information, see *IBM System/370 Installation Manual Physical Planning*, GC22-7004, and/or your Installation Planning Representative.

- Remote Servicing: A customer supplied data communication line with an exclusion key telephone (Canada only) of the WE503 or 2503 type (or equivalent) and a manual answer Data Protective Coupler (CDT type or equivalent) is necessary in order that higher level support may be received from the Field Support Center. These same facilities may also be used with RETAIN. The capability of using the RETAIN remote service/logout analysis is standard.

An integrated remote service facility modem (Except Canada+ or alternatively, an interface to an external modem +) is standard on 3082 and (except for Canada and Japan) will be provided for automatically by country code at the time of order. For Japan, specify #2948 and #2943 to obtain an internal modem with test connectors, or #3701 for an external modem (CCITT V.24). Connection of the IBM provided telephone interface cable to the telephone network must be arranged for by the customer. Each side of the 3082-X48 has a remote service facility modem. When ordering QX upgrade above specify codes must be shown where required.

- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.
- Remote 3278-2A Display Console: The standard cable for interconnecting the 3082 and the 3278-2A (system console) is a fixed length, 15 meter (49 feet) cable. Cables greater than 15 meters (49 feet), up to the maximum length of 1,500 meters (4,921 feet), may be obtained by RPQ 8P0891. Refer to HONE for description and order information.

**SPECIAL FEATURES**

**Channel To Channel Adapter (#1850 For First, #1851 For Second):** Provides the controlling element to interconnect two processors via their channels (either S/360 or S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. On mdl X48, the feature is located on the A-side. **Maximum:** Two, one #1850 and one #1851. **Field Installation:** Yes. **Prerequisites:** #1851 requires #1850.

**B-side CTC Adapter (#1852 for third, #1853 for fourth):** [Mdl X48] Provides the controlling element to interconnect two processors via their channels (either S/360, S/370 or 4300). Only one of the interconnected processors needs this feature. Uses one control unit position on each of the connected channels. Feature is located on the B-side of the 3082. **Limitations:** Mdl X48 only. **Maximum:** Two, one #1852 and one #1853. **Field Installation:** Yes. **Prerequisites:** #1853 requires #1852.

**I/O Power Sequence Control (#4650):** The 3082 Improved Models have a capability of associating up to 32 control units to a 3081 Improved Model, 3083 Improved Model, or the A-side of 3084

## MACHINES

**3082 Proc. Cntrl. (Improved Mdls) (cont'd)**

Improved Model Processor Complex for power-on/power-off control purposes. When requirements exceed these 32 power control relays, #4650 provides for power-on/power-off control for the 33rd through 64th control unit. **Maximum:** One. **Field Installation:** Yes.

**B-side I/O Power Sequence Control (#4651):** [ Mdl X48 ] The B-side of 3082-X48 has a standard capability of associating up to 32 control units to the B-side of the 3084 Improved Model for power sequence purposes. When requirements exceed these 32 power-control relays, #4651 provides for power-on/power-off control for the 33rd through 64th control unit attached to the B-side. **Limitations:** Available only on mdl X48. **Maximum:** One. **Field Installation:** Yes.

**MODEL CONVERSIONS**

Model upgrades are field installable. Upgrade to a model X48 may only take place from a model X24. Model downgrade from a model X48 to any other model is not available. 3082 Improved Models can not be converted to 3082.

**ACCESSORIES (None)****SUPPLIES (None)**

## 3083 PROCESSOR UNIT

### PURPOSE

Provides arithmetic, logic and control function through a single central processor and houses shared central storage and channels for a 3083 Processor Complex.

### MODELS B - J\*

Models			Bytes of Central Storage
E8	B8	J8	8,388,608
E16	B16	J16	16,777,216
E24	B24	J24	25,165,824
E32	B32	J32	33,554,432

\* (NO LONGER AVAILABLE -- model conversion, features, RPQs, and accessories are available.)

### MODELS BX, CX, EX, JX

Models				Bytes of Central Storage
CX0	EX0	BX0	JX0	8,388,608
CX1	EX1	BX1	JX1	16,777,216
CX2	EX2	BX2	JX2	25,165,824
CX3	EX3	BX3	JX3	33,554,432

**Note:** At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 64KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K bytes system area is available.

**Model Differences:** The various models of 3083 Improved Models are identical in function but vary in instruction execution rate (ranging from the slowest model E to the fastest model J and from the slowest model CX to the fastest model JX).

**Prerequisites:** Each 3083 Processor Unit Improved Model requires:

1. One 3082 Improved Mdl Processor Controller,
2. One 3087 Coolant Distribution Unit,
3. One 3278-2A Display Console as the system console, and
4. One 3089 Power Unit or other appropriate 400 Hz power source.

**Note:** See "Specify" under the M3082 Improved Model for appropriate Processor Unit Attachment Code.

Those customers using the 3087-1 CDU to cool their system must supply chilled water. See "S/370 Installation Manual - Physical Planning", GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

### HIGHLIGHTS

- Depending upon the model, contains up to 33,554,432 bytes of monolithic central storage.
- 312 nanosecond storage access cycle.
- 24 nanosecond central processor cycle.

- 8-byte data flow between the central processor and storage.
- A high speed buffer in the central processor.
- Buffer storage is transparent to a program and significantly reduces the effective access time of storage.
- Integrated byte and block multiplexer channels.
- Extensive use of LSI logic circuitry.
- Has the ability to operate in S/370 mode or 370-XA mode.
- 370 XA mode extends addressing to 2 GB and provides for hardware controlled channel pathing to an I/O device.
- Distributed microcode logic and control stores.
- Microcode assists for both MVS and VM/SP High-Performance Option.
- Extensive data checking.

### Standard Features:

- S/370 mode
- 370-XA mode
- Universal Instruction Set
- S/370 Extended Facility
- 3033 Extension Feature
- Extended addressing
- extended control mode
- PSW key handling
- Conditional swapping
- Set prefix
- Store prefix
- Signal processor
- Store CPU address
- Extended precision floating point
- Processor checkpoint retry
- Time-of-day clock
- Clock comparator
- CPU timer
- Interval timer
- Byte oriented operand feature
- Key controlled storage page protection
- Tracing protection
- Storage error checking and correction
- Storage configuration and control
- Dynamic address translation
- Program event recording
- Store status
- Program reset
- Set system-mask suppression
- Integrated channels
- Channel set switching
- Data streaming
- Start I/O fast release
- Clear I/O
- Virtual Machine Assist
- Preferred Machine Assist
- Start Interpretive Execution (SIE) Assist
- S/370-XA Sorting Assists.

**Channels:** The External Data Controller (EXDC) is an integrated I/O processor containing eight channels as basic. One optional channel group is available on mdls E, CX and EX. Two optional channel groups are available on mdls B, J, BX and JX. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted, and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface.

Each channel can address up to 256 I/O devices and may physically attach up to eight control units. In S/370 mode, physical channels may be given any valid logical designation. In 370-XA mode, the central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the channel paths to which the device is attached.

**Limitations:** In S/370 mode, address translation of page sizes is limited to 4K bytes and segment sizes to 64K bytes. Only 4K storage protect keys are used.

**Bibliography:** GC20-0001.

## SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4-wire or 5-wire, 50 Hz):
 

50 Hz		60 Hz	
200V	#2807	200V	#2733
220V	#2815	208V	#9903
380V	#2816	220V	#2800
400V	#2825	240V	#9915
415V	#2826		
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify #9491.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S are 945mm wide by 1,778mm long by 1,875mm high (37.2 in. x 70 in. x 73.8 in.). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8 in. x 70 in.). This reduction may be obtained by specifying #9571. Further reduction may be achieved by splitting Frame S into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6 in. x 70 in.). This reduction may be obtained by specifying #9572. Specify either #9571 or #9572 as required. For additional information, see "IBM System/370 Installation Manual - Physical Planning", GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators have weight limitations of 1,136kg/2,500 lb and may require partial depopulation of 3083 Improved Mdl frames to satisfy this limitation. Specify #9581 to reduce frame weights to less than 1,136kg/2,500 lb.
- RETAIN: The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Improved Mdl Processor Controller.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

## SPECIAL FEATURES

**Channel Group, First Add'l (#1545):** Provides the first add'l group of eight channels for any 3083. Maximum: One. Field Installable: Yes. Prerequisites: Every #1545 requires support from the appropriate mdl of a 3082 Processor Controller.

**Channel Group, Second Add'l (#1550):** Provides the second add'l group of eight channels for any mdl B, J, BX or JX. Prerequisites: Every #1550 also requires a #1545. Every #1550 requires support from a 3082 Processor Controller mdl X24. Limitations: Not available on mdls E, CX and EX. Maximum: One. Field Installable: Yes.

**Performance Feature (#4010):** (Not for X-series models) Improves performance by reducing the cycle time to 24.5 nanoseconds. Field Installation: Yes. Prerequisites: #4020 on the 3082 Processor Controller. Note: Customer Purchase Agreement Supplement must show, "Installation of this feature involves removal of parts which become the property of IBM".

## MODEL CONVERSIONS

(For Models B-J) Model upgrade from one 3083 to another is field installable. Parts removed or replaced become the property of IBM and must be returned. Model downgrade from model J to B, or from a model B to E, or from a 3081-K to a 3083-J, or from a 3081-G to a 3083-B, is not recommended. Model upgrade from a 3083-J to a 3081-K, from a 3083-B to a 3081-G, or from 3083-B to a 3081-K, is field installable. Parts removed or replaced become the property of IBM and must be returned. Any of the above upgrades require installation of feature #1545 (Channel Group First Add'l) on the 3083 as a prerequisite. Model conversion from 3083 to 3083 Improved Models is not available. Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES.

(For Models BX, CX, EX, JX) Model upgrade from one 3083 Improved Model to another is field installable. Parts removed or replaced become the property of IBM and must be returned. Model downgrade from model JX to BX, or from a model BX to EX, or from a model EX to CX, or from a 3081 Improved Model to a 3083 Improved Model is available. Model conversion from 3983 Improved Models to a 3083, or 3081 is not available. Model upgrade from a 3083-JX to a 3081-KX, or 3083-BX to a 3081-GX, or 3083-EX to BX, or 3083-EX to BX, or 3083-BX to JX, is field installable. Parts removed or replaced become the property of IBM and must be returned. Any 3083-JX upgrading to a 3081-KX, or any 3083-BX upgrading to a 3081-GX, requires installation of feature #1545 (Channel Group First Add'l) on the 3083 as a prerequisite action. Model upgrades combining performance and storage increases should be ordered as a single MES where possible. Feature additions should be ordered separately from any model upgrade MES.

## ACCESSORIES

The following is available on a purchase only basis for shipment with the 3083 Processor Complex.

**Console Table, 308X Processor Complex (#1560):** Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	#9441
Left end attachment	#9442
Willow Green	#9161
Garnet Rose	#9162
Sunrise Yellow	#9163
Classic Blue	#9164
Charcoal Brown	#9165
Pebble Gray	#9166
Pearl White	#9167

## SUPPLIES (NONE)

**MACHINES**
**3084 PROCESSOR UNIT**
**PURPOSE**

Provides arithmetic, logic and control function through four integrated central processors and houses shared central storage and channels for a 3084 Processor Complex. The processor unit may be partitioned and run as two independent dyadic configurations. The 3084 Processor is not orderable from the plant and can only be achieved by upgrading a 3081-K Processor. Model upgrade from a 3081-KX Processor Processor is not available.

**MODELS**

Models	Bytes of Central Storage
Q32	33,554,432
Q48	50,331,648
Q64	67,108,864
Q96	100,663,296
QC8	134,217,728

**Note:** At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB or 64KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K byte system area is available. A maximum of 4,080 devices is possible.

**Limitations:** In 370 mode, address translation is limited to 64K byte segments and 4K byte page sizes. Only 4K storage protect keys are used.

**Prerequisites:** Each 3084 Processor Unit requires:

1. One 3082 mdl Q Processor Controller,
2. Two 3087 mdl 1s or mdl 2s Coolant Distribution Unit,
3. Two 3278 mdl 2A Display Console as the system console, and
4. Two 3089 Power Unit or other appropriate 400 Hz power source.

Those customers using the 3087 mdl 1 CDU to cool their systems must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004 for model upgrade requirements.

**HIGHLIGHTS**

Depending upon the mdl, contains up to 134,217,728 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... four integrated central processors having a cycle time of 26 nanoseconds ... 8-byte data flow between each processor and storage ... each processor has its own high-speed buffer ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... concurrent repair of hardware is the normal maintenance procedure ... may operate as a single multiprocessor or partitioned into two dyadic configurations of an A-side and a B-side ... complete duplication of all critical functional elements ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370-XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM/SP High-Performance Option ... extensive data checking.

**Standard Features:** S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist ... Start Interpretive Execution (SIE) Assist ... S/370-XA Sorting Assists.

**Channels:** The External Data Controller (EXDC) is an integrated I/O processor containing 24 channels organized in three groups of eight. Two EXDC are integral to each 3084, one per side. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, any central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 48 channel paths to which the device is attached.

**3084 Tightly Coupled Multiprocessing:** The 3084 duplicates all critical function elements (4 Central Processors, 2 External Data Controllers, 2 System Controllers) and is supported by two of each type of support unit. Its normal method of operation is in 370-XA mode under the control of a single control program through a single operational interface and provides the greatest computational capability of any 308X Processor Complex. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure processor elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without requirement for IPL or IML. The continuing subsystem may consist of either half of the 3084. This provides very high availability of the surviving portion of the processor complex. When run as a 4-way tightly coupled multiprocessor, 3084 may operate only in 370-XA mode.

The 3084 may also be partitioned into two independent dyadic processors. The resultant dyadic configurations may be operated independently of each other in either 370-XA or S/370 mode.

**Bibliography:** GC20-0001.

**SPECIFY**

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify #9491 for the A-side capability and #9591 for the B-side capability.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S and Frame T are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying #9571. Further reduction may be achieved by splitting Frame S and Frame T into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying #9572. Specify either #9571 or #9572 as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning*, GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3084 frames to satisfy this limitation. Specify #9581 to reduce frame weights to less than 1,136kg/2,500 lbs.

**3084 Processor Unit (cont'd)**

- **RETAIN:** The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.
- **Machine Nomenclature:** #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

**SPECIAL FEATURES**

**Performance Feature (#4010):** [A-side] Improves performance by reducing cycle time to 24.5 nanoseconds. **Limitations:** A-side only. **Field Installation:** Yes. **Prerequisites:** #4011 on B-side. #4020 and #4021 on the 3082-Q48. **Note:** Customer Purchase Agreement Supplement must show, "Installation of this feature involves removal of parts which become the property of IBM."

**Performance Feature (#4011):** [B-side] Improves performance by reducing cycle time to 24.5 nanoseconds. **Limitations:** B-side only. **Field Installation:** Yes. **Prerequisites:** #4010 on A-side. #4020 and #4021 on the 3082-Q48. **Note:** Customer Purchase Agreement Supplement must show, "Installation of this feature involves removal of parts which become the property of IBM."

**MODEL CONVERSIONS**

Model upgrades from 3081-K to a 3084-Q and storage upgrades within 3084-Q are field installable. Parts removed or replaced become the property of IBM and must be returned. **Upgrade Prerequisites:** Prior to model upgrading any 3081-K to a 3084-Q, the 3081-K must have installed feature #1550 and one-half of the storage capacity of 3084-Q. Only symmetrical upgrades are allowed. Model downgrade from 3084-Q to a 3081-K is not recommended. Model conversion from a 3084 to 3084 Improved Models is not available.

**ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3084 Processor Complex.

**Console Table, 308X Processor Complex (#1560):** Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	#9441	Sunrise Yellow	#9163
Left end attachment	#9442	Classic Blue	#9164
		Charcoal Brown	#9165
Willow Green	#9161	Pebble Gray	#9166
Garnet Rose	#9162	Pearl White	#9167

**SUPPLIES (None)**

## 3084 PROCESSOR UNIT (IMPROVED MODELS)

### PURPOSE

Provides arithmetic, logic and control function through four integrated central processors and houses shared central storage and channels for a 3084 Processor Complex. The processor unit may be partitioned and run as two independent dyadic configurations. The 3084 Processor is orderable from the plant and or can be achieved by upgrading a 3081-KX Processor in the field.

### MODELS

Models	Bytes of Central Storage
QX3	33,554,432
QX4	50,331,648
QX6	67,108,864
QX9	100,663,296
QXC	134,217,728

**Note:** At initial microcode load time, a minimum of 327,680 bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon channel attachment needs for configurations requiring greater than 512 UCWs, additional system area assignments are required. Expansion of the system area occurs automatically in 32KB or 64KB increments (up to 589,824 bytes) as determined by the size of the I/O configuration. If required, an additional 512K byte system area is available. A maximum of 4,080 devices is possible.

**Limitations:** In 370 mode, address translation is limited to 64K byte segments and 4K byte page sizes. Only 4K storage protect keys are used.

**Prerequisites:** Each 3084 Processor Unit Improved Model requires:

1. One 3082 mdl X48 Processor Controller,
2. Two 3087 mdl 1s or mdl 2s Coolant Distribution Unit,
3. Two 3278 mdl 2A Display Console as the system console, and
4. Two 3089 Power Unit or other appropriate 400 Hz power source.

Those customers using the 3087 mdl 1 CDU to cool their systems must supply chilled water. See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004. In addition, the System Control Program will require an appropriate operator console in addition to the system console. Access to a 3274 mdl X1B or X1D, or availability of an operator console is required to satisfy the minimum service configuration.

See *IBM System/370 Installation Manual - Physical Planning*, GC22-7004 for model upgrade requirements.

### HIGHLIGHTS

Depending upon the mdl, contains up to 134,217,728 bytes of monolithic central storage ... 312 nanosecond storage access cycle ... four integrated central processors having a cycle time of 24 nanoseconds ... 8-byte data flow between each processor and storage ... each processor has its own high-speed buffer ... buffer storage is transparent to a program and significantly reduces the effective access time of storage ... concurrent repair of hardware is the normal maintenance procedure ... may operate as a single multiprocessor or partitioned into two dyadic configurations of an A-side and a B-side ... complete duplication of all critical functional elements ... integrated byte and block multiplexer channels ... extensive use of LSI logic circuitry ... has the ability to operate in S/370 mode or 370-XA mode ... 370-XA mode extends addressing to 2 GB and for hardware controlled channel pathing to an I/O device ... distributed microcode logic and control stores ... microcode assists for both MVS and VM/SP High-Performance Option ... extensive data checking.

**Standard Features:** S/370 mode ... 370-XA mode ... Universal Instruction Set ... S/370 Extended Facility ... 3033 Extension Feature ... extended addressing ... extended control mode ... PSW key handling ... conditional swapping ... set prefix ... store prefix ... signal processor ... store CPU address ... extended precision floating point ... processor checkpoint retry ... time-of-day clock ... clock comparator ... CPU timer ... interval timer ... byte oriented operand feature ... key controlled storage page protection ... tracing protection ... storage error checking and correction ... configuration control ... dynamic address translation ... program event recording ... store status ... program reset ... set system-mask suppression ... integrated channels ... channel set switching ... data streaming ... start I/O fast release ... clear I/O ... Virtual Machine Assist ... Preferred Machine Assist ... Start Interpretive Execution (SIE) Assist ... S/370-XA Sorting Assists.

**Channels:** The External Data Controller (EXDC) is an integrated I/O processor containing 24 channels organized in three groups of eight.

Two EXDC are integral to each 3084 Improved Model, one per side. Channels are configurable as either byte or block multiplexer channels. A maximum of four byte multiplexer channels are permitted and are assignable only within the first two physical channel groups. Byte multiplexer channels can operate only with unshared devices. Where byte multiplexer channels are not needed, block multiplexer channels may be substituted. All block multiplexer channels are capable of data streaming and are capable of operating at data rates up to three million bytes/second across a 1-byte interface. Each channel can address up to 256 I/O devices and may physically attach up to eight control units.

In S/370 mode, channels may be grouped into two logical channel sets, with up to 16 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, physical channels may be given any valid logical designation.

In 370-XA mode, any central processor may initiate an operation with any I/O device and process any I/O interruption, using any of the 48 channel paths to which the device is attached.

**3084 Improved Model Tightly Coupled Multiprocessing:** The 3084 Improved Model duplicates all critical function elements (4 Central Processors, 2 External Data Controllers, 2 System Controllers) and is supported by two of each type of support unit. Its normal method of operation is in 370-XA mode under the control of a single control program through a single operational interface and provides the greatest computational capability of any 308X Processor Complex. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure processor elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without requirement for IPL or IML. The continuing subsystem may consist of either half of the 3084 Improved Model. This provides very high availability of the surviving portion of the processor complex. When run as a 4-way tightly coupled multiprocessor, 3084 Improved Model may operate only in 370-XA mode.

The 3084 Improved Model may also be partitioned into two independent dyadic processors. The resultant dyadic configurations may be operated independently of each other in either 370-XA or S/370 mode.

**Bibliography:** GC20-0001.

### SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Power: When 400 Hz power source is other than the 3089 Power Unit, specify #9491 for the A-side capability and #9591 for the B-side capability.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) The standard external dimensions of Frame S and Frame T are 945mm wide by 1,778mm long by 1,875mm high (37.2" x 70" x 73.8"). Should these dimensions need reduction, the side covers may be removed, reducing external dimension to 858mm wide by 1,778mm long (33.8" x 70"). This reduction may be obtained by specifying #9571. Further reduction may be achieved by splitting Frame S and Frame T into two subframes, the largest of which has external dimensions of 778mm by 1,778mm long (30.6" x 70"). This reduction may be obtained by specifying #9572. Specify either #9571 or #9572 as required. For additional information, see *IBM System/370 Installation Manual - Physical Planning*, GC22-7004, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some older elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3084 frames to satisfy this limitation. Specify #9581 to reduce frame weights to less than 1,136kg/2,500 lbs.

**3084 Processor Unit (Improved Models) (cont'd)**

- **RETAIN:** The capability of using the RETAIN remote service/logout analysis is standard and provided by the 3082 Processor Controller.
- **Machine Nomenclature:** #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

**SPECIAL FEATURES (None)**
**MODEL CONVERSIONS**

Model upgrades from 3081-KX to a 3084-QX and storage upgrades within 3084-QX are field installable. Parts removed or replaced become the property of IBM and must be returned. **Upgrade Prerequisites:** Prior to model upgrading any 3081-KX to a 3084-QX, the 3081-KX must have installed feature #1550 and one-half of the storage capacity of 3084-QX. Only symmetrical upgrades are allowed. Model downgrade from 3084-QX to a 3081-KX is not recommended. Model upgrades from a 3081-K to a 3084-QX are not available.

**ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3084 Processor Complex.

**Console Table, 308X Processor Complex (#1560):** Provides an operator workstation with a durable melamine working surface for up to two operators and their display consoles. The table has a color-accented front modesty panel, internal cable channels for routing phone lines and display cables and is designed for a raised floor environment. A raised accessory panel designed to accommodate wall mountable equipment such as tackboards, telephones or intercoms is attached to either one end or the other of the console table. The table measures 1,780mm x 815mm and the end accessory panel is 265mm higher than the 720mm table height. Specify end attachment of accessory panel and color of modesty panel.

Right end attachment	#9441	Sunrise Yellow	#9163
Left end attachment	#9442	Classic Blue	#9164
		Charcoal Brown	#9165
Willow Green	#9161	Pebble Gray	#9166
Garnet Rose	#9162	Pearl White	#9167

**SUPPLIES (None)**



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MACHINES

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## 3087 COOLANT DISTRIBUTION UNIT

### PURPOSE

Provides the coolant distribution required by a 3081, 3083, or 3084 Processor Unit.

### MODELS

Model 1 001  
Model 2 002

### HIGHLIGHTS

Contains the heat exchanger, pumps and controls necessary to cool the liquid cooled portion of the 3081, 3083 or 3084 Processor Unit. The 3087-1 uses the efficiency of water cooling and evacuates its heat to chilled water, while the 3087-2 evacuates its heat to the air of the computer room.

The 3087 supports a 3081, 3083 or 3084 Processor Unit. Two 3087 mdl 1s or two 3087 mdl 2s are required to support a 3084 Processor Unit. They cannot be intermixed.

Note: If mdls are switched in the field, a new M01 diskette is required for the 3081, 3083, or 3084 Processor Unit. Show serial number of CPU on the MES when ordered. Serial number of processor being attached-too must be shown on machine order.

Bibliography: GC20-0001.

### SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz, or 4- or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

SPECIAL FEATURES (None)

MODEL CONVERSIONS (None)

ACCESSORIES (None)

SUPPLIES (None)

## 3088 MULTISYSTEM CHANNEL COMM. UNIT MODELS A1, 1, 2

### PURPOSE

Provides for inter-processor communications over block, multiplexer channels.

### MODELS

**Model A1 0A1:** Interconnects up to two processors.

**Model 1 001:** Interconnects up to four processors.

**Model 2 002:** Interconnects up to eight processors.

**Prerequisites:** An available control unit position on a block multiplexer channel for each processor connected. A block of modulo 32 or 64 addresses is required on each channel to which the 3088 is attached. Refer to the specific configuration requirements in the "IBM 3088 Multisystem Channel Communication Unit Product Description Manual", GA22-7081.

### HIGHLIGHTS

The 3088 is a stand-alone I/O control unit using a multiple address architecture which operates in a manner similar to current channel-to-channel adapters (CTCA). The Model A1 supports up to 63 logical CTCAs distributed across two CPU interfaces. The Model 1 supports up to 126 logical CTCAs distributed across four CPU interfaces. The Model 2 supports up to 252 logical CTCAs distributed across eight interfaces. The 3088 is attached to block multiplexer channels with or without data streaming. Data transfers can be active between two separate pairs of channels in either high-speed transfer mode between 0.7 and 2.1M bps or in data streaming mode at 1.125M bps, 3.0M bps, or at 4.5M bps (4.5M bps operation requires both EC A50442 and Reduced Diameter Channel cables, channel group 0815, between the 3088 and the channel operating at 4.5M bps), but will operate at the speed of the slower of the two connected channels.

Where the 3088 is attached to a low priority block multiplex channel, and where the I/O interface cable lengths are very short (6.1m; 20 ft), certain configurations may experience DASD overrun problems with the higher priority block multiplexer channels. In such cases, the 3088 may be configured by service personnel at installation time so that the high-speed transfer mode data rate does not exceed 1.2M bps.

The early disconnect feature of the 3088 makes possible its coexistence on a channel with other control units through the use of channel command retry. Like the S/370 CTCA feature, each of the 3088 CTCA links can operate in either S/360 compatibility mode or in S/370 extended mode, selectable under program control.

The cable length from the 3088 to the channel can be up to 400 ft, (up to 800 ft of cable between channels) allowing greater configuration flexibility. However, for the maximum distance, the 3088 must be the only control unit on the I/O interface. The number and type of other devices sharing the I/O interface are among the factors which limit the maximum cable length.

**System Attachments:** The following processor attachments are supported: 4331-2, 4341, 4361, 4381, 3031, 3032, 3033, 3042 Attached Processor Model 2, 3081, 3083, 3084 and 3090 Processor Complexes.

**Publications:** "IBM 3088 Multisystem Channel Communication Unit Product Description Manual", (GA22-7081).

### SPECIFY

#### Power (AC, 1-phase):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Color: The standard color for this unit is pearl white. Those wishing accents should specify #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown or #9065 for pebble gray.

#### Machine Nomenclature:

Canadian French #2935	Spanish #2931
English US #2924	

Default is International. (Japanese #2930 Default is English US #2924)

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS

Model A1 to Model 1, Model A1 to Model 2, and Model 1 to Model 2 conversion.

### ACCESSORIES

**Cables:** Cables to attach 3088 may be purchased from IBM or from a customer-selected source. See "Installation Manual-Physical Planning", GC22-7064, for specifications.

All cables must be ordered. Two sets, up to 23m (75 ft) each, may be ordered without charge at initial installation of the Model A1; four sets, up to 23m (75 ft) each, may be ordered without charge at initial installation of the Model 1 and eight sets, up to 31m (100 ft) each, at initial installation of the Model 2. Unused allowances will not be credited for future use, or added to the allowed length of another cable set. For field upgrades from the Model A1 to the Model 1, two sets, up to 23m (75 ft) each, may be ordered without charge. For field upgrades from the Model A1 to the Model 2, eight sets, up to 31m (100 ft) each, may be ordered without charge. For field upgrades from the Model 1 to the Model 2, eight sets, up to 31m (100 ft) each may be ordered without charge. Other cable lengths over that provided will be charged for on a per foot basis. For example, if a 125 ft cable is ordered for the Model 1, the customer is charged for the 50 ft of cable over the 23m (75 ft) allowance. This is the only applicable charge for cable lengths beyond the lengths provided. Order cables within the allowance via normal cable ordering procedures. Order cables longer than the allowance via MES.

Assembled cables may be purchased from IBM. Specify cable assembly number.

Item	Number	Description	Max Length
Assm.	2281630	OEMI Cable	121.9m (400 ft)

### SUPPLIES (NONE)

## 3089 POWER UNIT

### PURPOSE

- Provides 400 Hz power for a 3081/3083/3084 Processor Complex and 3090 Processor Complex.

### MODELS

Model 1 001

Model 3 003

**Limitations:** A 3089 model 1 cannot be used with 3081 or 3083 Processor Units equipped with specify feature #9491, or 3084 Processor Units equipped with specify features #9491 and #9591. A 3089 model 3 cannot be used with 3097 Power and Coolant Distribution Units equipped with specify feature #9488, #9491 or #9496.

### HIGHLIGHTS

- The 3089 model 1 Power Unit is designed to be the standard source of power for the 3081/3083/3084 Processor Complex.
- One 3089 model 1 is required to support a 3083 or 3081 Processor Complex if the 3089 is chosen as the power source.
- Two 3089 model 1s are required to support a 3084 Processor Complex if the 3089 is chosen as the power source.
- One 3089 model 3 is required to support a 3090 model 120E, 150 or 3090 model 150E Processor Complex if the 3089 is chosen as the power source.
- One 3089 model 3 is required to support a 3090 model 180 or 3090 model 180E Processor Complex except for a configuration consisting of a Vector Facility and greater than 128MB of expanded storage, which requires two if the 3089 is chosen as the power source.
- Two 3089 model 3s are required to support a 3090 model 200, 3090 model 200E or 3090 model 300E Processor Complex if the 3089 is chosen as the power source.
- Four 3089 model 3s are required to support a 3090 model 400, 3090 model 400E or 3090 model 600E Processor Complex if the 3089 is chosen to be the power source.
- The unit has the same color coordinated covers as other units in the central complex, meets IBM machine room environmental standards and is suitable for locating within the machine room.

**Publications:** GC20-0001.

### SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	380V #2824
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.

- Shipping Instructions: (Use of this specify option will increase installation time. Use only when required.) Should the standard external dimensions of the 3089, 815mm wide by 1,640mm long (32 in. x 64.5 in.), require reduction to 750mm wide by 1,525mm long (29.5 in. x 60 in.), specify #9572. Specify code #9572 reduces the length of 3089 by removal of covers/hardware. For additional information, see "IBM System/370 Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.
- Cables: The standard cables provided with the 3089 model 1 are 15.2m (50 ft) long and with the 3089 model 3 are 10.6m (35 ft) long. Cables may be ordered in lengths of up to 38.1m (125 ft). For longer cable lengths, contact Special Product Marketing. Specify #9988 if cables other than the standard length are being installed. By contacting Special Product Marketing, a sales representative will be able to get the necessary RPO information on the 50 and 75 foot cables that are available on the 3089 Mdl 3.

To ensure that the proper external cables are provided for the 3089 model 3, specify one of the following for each 3089 model 3 that is being ordered:

- #9489 - First 3089 model 3 to be used with a model 120E, 150, 150E, 180, 180E, 200, 200E, 300E, or with the A-side of a model 400, 400E or 600E Processor Unit.
- #9493 - Second 3089 model 3 to be used with a model 180, 180E, 200, 200E, 300E or with the A-side of a model 400, 400E or 600E.
- #9497 - First 3089 model 3 to be used with the B-side of a model 400, 400E or 600E Processor Unit.
- #9498 - Second 3089 model 3 to be used with the B-side of a model 400, 400E or 600E Processor Unit.

In addition, specify #9925 or #9926 depending on which of the following processor groups the 3089 model 3 is to be used with. If the 3089 is for attachment to an installed model 400 B-side 3097 the serial number used for selection of the second device code should be that of frame 12 on the B-side.

Specify #9925 if the 3089 model 3 is for use with a 3097 model 1 or 2 attached to:

- A new system shipped from the plant
- An installed system at or above serial number 70820
- An installed system from the following serial number set:
  - 51040202, 51040205, 51040206
  - 51040231 through 51040236
  - 51040249 through 51040252
  - 51040254 or above
- An installed system at or above serial number 97080144

Specify #9926 if the 3089 model 3 is for use with a 3097 model 1 or 2 attached to:

- An installed system with serial number 70819 or lower
- An installed system with serial numbers:
  - 51040201 or lower
  - 51040203, 51040204
  - 51040207 through 51040230
  - 51040237 through 51040248
  - 51040253
- An installed system with serial number 97080143 or lower

- Line Cord: The 3089 model 3 draws over 125 amperes. If, as a result, local electrical codes require that the line cord be hardwired, specify #9987.

(Canada only > Note: Hardwiring is mandatory in Canada. <)

**SPECIAL FEATURES (NONE)**

**ACCESSORIES (NONE)**

**MODEL CONVERSIONS**

**SUPPLIES (NONE)**

Model upgrades from 3089 model 1 to 3089 model 3 are not available. Model downgrades from 3089 model 3 to 3089 model 1 are not recommended.

## 3090 PROCESSOR UNIT

### THIS PRODUCT HAS MORE THAN ONE MODEL DESCRIPTION

#### 3090 PROCESSOR UNIT MODEL 200

##### PURPOSE

Provides arithmetic, logic and control function through two integrated central processors with optional Vector Facilities and houses shared central storage, expanded storage, and channels for a 3090 Model 200 Processor Complex.

##### MODEL 200

**Model 200:** 67,108,864 (bytes) Central Storage

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 200 Processor Unit requires:

1. One 3092 Model 1 Processor Controller,
2. One 3097 Model 1 Power and Coolant Distribution Unit,
3. Two 3089 Model 3 Power Units or other appropriate 400 Hz power source,
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150),
5. Two 3180 Model 140 Display Stations.
6. A 4800 bps switched network modem supporting an autocall/autoanswer feature.
7. Access to a path of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 1 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. Access to a 3274 Model X1B or X1D, or the availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also required for installation and certain maintenance functions.

##### HIGHLIGHTS

Contains 67,108,864 bytes of monolithic central storage -- two integrated central processors, each having a cycle time of 18.5 nanoseconds -- eight-byte data flow between each processor and storage -- each processor has its own 65,536 byte high-speed buffer

(buffer storage is transparent to a program and significantly reduces the effective access time of central storage) -- optional integrated expanded storage for high-speed paging -- optional vector facilities for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for hardware controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set -- Start Interpretive Execution (SIE) assist.

**Standard Features:** S/370 mode -- 370-XA mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high-speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- Sort Assist.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments of 64Mb up to a maximum of 256MB.

**Vector Facility:** The Vector Facility, optionally available for each of the central processors, enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum each cycle.

**Channels:** A total of 32 channels are standard. Two additional groups of eight block multiplexer channels each are optional, providing for a total of up to 48 channels. Up to four channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode, channels may be grouped into two logical channel sets, with up to 32 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, channels may be given any valid logical designation.

In 370-XA mode, any processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 48 channel paths. The 3090 Complex can use up to a maximum of four different logical paths to a single device.

**Publication:** GC20-0001

##### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	380V #2824

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 1 Processor Controller attached to this 3090 Processor Unit is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3,865mm wide by 1,795mm long (34 in. x 70.5 in.), the longest frame, require reduction in length, specify #9573. Specify code #9573 reduces frame 3 length to 1,590mm (62.5 in.) by removal of tailgate connector panel only. Should the standard external dimensions of the 3090 Processor Unit frames (except frame 9) require reduction of 815mm wide by 1,525mm long (32 in. x 60 in.), specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3, and 5 by removal of covers/hardware. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3090 Processor frames to satisfy this limitation. Specify #9581 to reduce frame 2 and frame 3 weights to less than 1,136kg/2,500 lbs. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Remote Support Facility (RSF): The capability of using the RSF remote service/logout analysis is standard and provided by the 3092 Processor Controller.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

#### Account Universal Lift Tool: Select one:

- First 3090 ordered in an establishment, specify #9330.
- If 3090 ordered is second to be installed, no additional lift tool is required.
- If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

#### SPECIAL FEATURES

**Vector Facility, First (#1545):** Provides the vector facility capability to the first central processor. Prerequisites: Specify #9983, Vector Facility, on the 3097 Power and Coolant Distribution Unit being used with the 3090 Model 200. See M3097 pages. Prerequisites: #7330. Maximum: One. Field Installation: Yes.

**Vector Facility, Second (#1550):** Provides the vector facility capability to the second central processor. Prerequisites: #1545. Maximum: One. Field Installation: Yes.

**Channel Group First Add'l (#3850):** Provides the first additional group of eight block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Channel Group Second Add'l (#3851):** Provides the second additional group of eight block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3850.

**Expanded Storage, 64Mb (#5064):** Provides the first 64Mb increment of expanded storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 128Mb (#5128):** Provides 128Mb of expanded storage. Cannot be ordered with #5064. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 192Mb (#5192):** Provides 192Mb of expanded storage. Cannot be ordered with #5064 or #5128. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 256Mb (#5256):** Provides 256Mb of expanded storage. Cannot be ordered with #5064, #5128 or #5192. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb to 128Mb (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage. Order by MES only. Maximum: One. Field Installation: Yes. Prerequisites: #5064.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage. Order by MES only. Maximum: One. Field Installation: Yes. Prerequisites: #5064.

**Expanded Storage, 64Mb to 256Mb (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage. Order by MES only. Maximum: One. Field Installation: Yes. Prerequisites: #5064.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage. Order by MES only. Maximum: One. Field Installation: Yes. Prerequisites: #5128 or #6128.

**Expanded Storage, 128Mb to 256Mb (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage. Order by MES only. Maximum: One. Field Installation: Yes. Prerequisites: #5128 or #6128.

**Expanded Storage, 192Mb to 256Mb (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage. Order by MES only. Maximum: One. Field Installation: Yes. Prerequisites: #5192, #6192 or #6193.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expansion Frame (#7330):** Provides the housing for the first and second 3090 Vector Facilities (#1545, #1550). Required for the installation of #1545. Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #1545.

#### MODEL CONVERSIONS

Model upgrades from 3090 Model 200 to 3090 Model 300E, from 3090 Model 200 to 3090 Model 400 and from 3090 Model 200 to 3090 Model 400E are field installable and the parts removed or replaced become the property of IBM and must be returned. Model downgrades are not recommended.

**Note:** Any 3090 Model 200 upgrade to 3090 Model 300E requires that feature code #7330 be installed prior to or as part of the upgrade. The price of this feature is in addition to the upgrade price. Also required are changes to the 3097. Any 3090 Model 200 upgrade to a 3090 Model 400 may require installation of features on the 3090 Model 200 in order to provide symmetry in channels and expanded storage on the 3090 Model 400, will require a model change on the installed 3092 and will require installation of features on the 3097s. Any 3090 Model 200 upgrade to a 3090 Model 400E may require in-

Installation of features on the 3090 Model 200 in order to provide symmetry in channels and expanded storage on the 3090 Model 400E, will require a model change on the installed 3092 and will require installation of features on the installed 3097 as well as an additional 3097. Installation of features required for symmetry on the 3090 Model 200 is a prerequisite to upgrading. Feature additions on the 3090 Model 200 should be ordered separately from any model upgrade MES unless adding a Vector Facility or Additional Central Storage.

**ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator workstation for up to two operators and their display con-

soles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,780mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for willow green, #9162 for garnet rose, #9163 for sunrise yellow, #9164 for classic blue, #9165 for charcoal brown, #9166 for pebble gray, or #9167 for pearl white.

**SUPPLIES (NONE)**

## 3090 PROCESSOR UNIT MODEL 400

### PURPOSE

Provides arithmetic, logic and control function through four integrated central processors with optional Vector Facilities, and houses shared central storage, expanded storage, and channels for a 3090 Model 400 Processor Complex. Available as a 3090 Processor Unit Model 400 and by MES to upgrade a 3090 Model 200 to a Model 400.

### MODEL 400

**Model 400:** 134,217,728 (bytes) Central Storage

**Note:** At initial microcode load time, a minimum of 576K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte per partition and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 400 Processor Unit requires:

1. One 3092 Model 2 Processor Controller,
2. Two 3097 Model 1 or 2 Power and Coolant Distribution Units, two 3097 Model 1 or two Model 2 or one Model 1 and one Model 2 can be used. I/O power sequence controls are provided on 3097 Model 1, otherwise both models provide the same functions.
3. Four 3089 Model 3 Power Units or other equivalent 400 Hz power source,
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150),
5. Three 3180 Model 140 Display Stations.
6. Two 4800 bps switched network modems each supporting an autocall/autoanswer feature.
7. Access to two paths of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires an appropriate operator stations. In single-image a minimum of one and in partitioned mode a minimum of two operator stations are required in addition to the two 3180 system and the 3180 service support display stations. Access to a 3274 Model X1B or X1D, or the availability of an operator console is required for each to satisfy the minimum service configuration. Access to a tape drive is also required from each partition for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 134,217,728 bytes of monolithic central storage -- four integrated central processors, each having a cycle time of 18.5 nanoseconds -- eight-byte data flow between each processor and storage -- each processor has its own 65,536 byte high-speed buffer (buffer storage is transparent to a program and significantly reduces the effective access time of central storage) -- optional integrated expanded storage for high-speed paging -- optional vector facilities for greatly increasing the processor's engineering and scientific processing capabilities -- concurrent repair of a hardware

partition is the normal maintenance procedure -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for hardware controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data error checking -- S/370 mode provides for up to 32 channels per channel set -- Start Interpretive Execution (SIE) assist.

**Standard Features:** S/370 mode -- 370-XA mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high-speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- Sorting Instructions.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments of 128Mb (64Mb increments per side) up to a maximum of 256Mb.

**Vector Facility:** The Vector Facility, optionally available for each of the central processors, enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical Vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle, except in a divide when the element produces a result every 16 cycles. Compound operations can produce both a product and a sum each cycle.

**Channels:** A total of 64 channels are standard; 32 channels on the A-side and 32 channels on the B-side. Up to 96 channels are available in increments of 16 channels, each increment being split between the A and B sides. Up to eight channels (four on each side) may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode (when the Model 400 is in Physically Partitioned Mode), channels may be grouped into logical channel sets, with up to 32 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, channels may be given any valid logical designation.

In 370-XA mode, any processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 96 channel paths in single-image mode or any of the 48 channel paths in partitioned mode. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

**3090 Model 400 Tightly Coupled Multiprocessing:** The normal operation of the 3090 Model 400 is in 370-XA mode under control of a single control program through a single operational interface and provides the greatest computational capability of any 3090 Processor Complex. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure processor elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without an IPL or IML. The continuing subsystem may consist of either half of the 3090 Model 400. This provides very high availability of the surviving portion of the

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processor complex. When run in a single-image mode the 3090 Model 400 may operate only in 370-XA mode.

The 3090 Model 400 may also be partitioned into two independent dyadic processors. The resultant dyadic configurations may be operated independently of each other in either 370-XA or S/370 mode.

**Publications:** GC20-0001

## SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	380V #2824
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.
- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 2 Processor Controller attached to this 3090 Processor Unit are 3420 Models 4, 6 or 8 or equivalent, or #9202 if the tape drives are 3480 Models B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frames 3 (13), 865mm wide by 1,795mm long (34 in. x 70.5 in.), the longest frame, require reduction of length, specify #9573 (#9673). Specify code #9573 (#9673) reduces frame 3 (13) length to 1,590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Model Processor frames require reduction to 820mm (32 in.) wide by 1,525mm (60 in.) long, specify #9571 (#9671). Specify code #9571 (#9671) reduces external dimensions of frames 1 (11), 2 (12), 3 (13) and 5 (15) by removal of covers/hardware. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3090 Processor frames to satisfy this limitation. Specify #9581 (#9681) to reduce frame 2 (12) and frame 3 (13) weights to less than 1,136kg/2,500 lbs. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Remote Support Facility (RSF): The capability of using the RSF remote service/logout analysis is standard and provided by the 3092 Processor Controller.
- Machine Nomenclature: #2924 for English US, #2931 for Spanish, #2935 For Canadian French, #2930 for Japanese.
- Multiprocessing: Specify #9984, Multiprocessing, on the 3097 Power and Coolant Distribution Unit used with the A-side of the model 400 Processor. Specify #9985, Multiprocessing, on the 3097 Power and Coolant Distribution Unit being used with the B-side of the model 400 Processor. See M3097.

**3090 Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330.

2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

## SPECIAL FEATURES

**Vector Facility, First, A-Side (#1545):** Provides the vector facility capability to the first central processor on the A-side. Prerequisites: Specify #9983, Vector Facility, on the 3097 Power and Coolant Distribution Unit to be used with the A-side of the 3090 Model 400. See M3097 pages. Prerequisite: #7330. Maximum: One. Field Installation: Yes.

**Vector Facility, First, B-Side (#1546):** Provides the vector facility capability to the first central processor on the B-side. Prerequisites: Specify #9983, Vector Facility, on the 3097 Power and Coolant Distribution Unit to be used with the B-side of the 3090 Model 400. See M3097 pages. Prerequisite: #7331. Maximum: One. Field Installation: Yes.

**Vector Facility, Second, A-Side (#1550):** Provides the vector facility capability to the second central processor on the A-side. Prerequisites: #1545. Maximum: One. Field Installation: Yes.

**Vector Facility, Second, B-Side (#1551):** Provides the vector facility capability to the second central processor on the B-side. Prerequisites: #1546. Maximum: One. Field Installation: Yes.

**Channel Group First Add'l, A-Side (#3850):** Provides the first additional group of eight block multiplexer channels on the A-side. Prerequisites: None. Corequisite: #3852. Maximum: One. Field Installation: Yes.

**Channel Group Second Add'l, A-Side (#3851):** Provides the second additional group of eight block multiplexer channels on the A-side. Prerequisites: #3850. Corequisite: #3853. Maximum: One. Field Installation: Yes.

**Channel Group First Add'l, B-Side (#3852):** Provides the first additional group of eight block multiplexer channels on the B-side. Prerequisites: None. Corequisite: #3850. Maximum: One. Field Installation: Yes.

**Channel Group Second Add'l, B-Side (#3853):** Provides the second additional group of eight block multiplexer channels on the B-side. Prerequisites: #3850 and #3852. Corequisite: #3851. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64MB, A-Side (#5064):** Provides the first 64Mb increment of expanded storage on the A-side. Prerequisites: None. Corequisite: #7064. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb, A-Side (#5128):** Provides 128Mb of expanded storage on the A-side. Cannot be ordered with #5064. Prerequisites: None. Corequisite: #7128. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192MB, A-Side (#5192):** Provides 192Mb of expanded storage on the A-side. Cannot be ordered with #5064 or #5128. Prerequisites: None. Corequisite: #7192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256MB, A-Side (#5256):** Provides 256Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128 or #5192. Prerequisites: None. Corequisite: #8256. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb, A-Side (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage on the A-side. Order by MES only. Prerequisites: #5064. Corequisite: #7128 or #8128. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during the field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb, A-Side (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage on the A-side. Order by MES only. Prerequisites: #5064. Corequisite: #7192 or #8192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb, A-Side (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage on the A-side. Order by MES only. Prerequisites: #5064. Corequisite: #7256 or #8256. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb, A-Side (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage on the A-side. Order by MES only. Prerequisites: #5128 or #6128. Corequisite: #7192 or #8193. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb, A-Side (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage on the A-side. Order by MES only. Prerequisites: #5128 or #6128. Corequisite: #7256 or #8257. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb to 256Mb, A-Side (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage on the A-side. Order by MES only. Prerequisites: #5192, #6192 or #6193. Corequisite: #7256 or #8258. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64MB, B-Side (#7064):** Provides the first 64Mb increment of expanded storage on the B-side. Prerequisites: #5064. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128MB, B-Side (#7128):** Provides 128Mb of expanded storage on the B-side. Cannot be ordered with #7064. Prerequisites: #5128 or #6128. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192MB, B-Side (#7192):** Provides 192Mb of expanded storage on the B-side. Cannot be ordered with #7064 or #7128. Prerequisites: #5192, #6192 or #6193. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256MB, B-Side (#7256):** Provides 256Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128 or #7192. Prerequisites: #5256, #6256, #6257 or #6258. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expansion Frame, A-Side (#7330):** Provides the housing for the first and second 3090 Vector Facilities on the A-side (#1545, #1550). Required for the installation of #1545. Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #1545.

**Expansion Frame, B-Side (#7331):** Provides the housing for the first and second 3090 Vector Facilities on the B-side (#1546, #1551). Required for the installation of #1546. Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #1546.

**Expanded Storage, 64Mb to 128Mb, B-Side (#8128):** Provides an upgrade from 64Mb to 128Mb of expanded storage on the B-side. Order by MES only. Prerequisites: #7064 and #6128. Corequisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb, B-Side (#8192):** Provides an upgrade from 64Mb to 192Mb of expanded storage on the B-side.

Order by MES only. Prerequisites: #7064 and #6192. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb, B-Side (#8256):** Provides an upgrade from 64Mb to 256Mb of expanded storage on the B-side. Order by MES only. Prerequisites: #7064 and #6256. Corequisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb, B-Side (#8193):** Provides an upgrade from 128Mb to 192Mb of expanded storage on the B-side. Order by MES only. Prerequisites: (#7128 or #8128) and #6193. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb, B-Side (#8257):** Provides an upgrade from 128Mb to 256Mb of expanded storage on the B-side. Order by MES only. Prerequisites: (#7128 or #8128) and #6257. Corequisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb to 256Mb, B-Side (#8258):** Provides an upgrade from 192Mb to 256Mb of expanded storage on the B-side. Order by MES only. Prerequisites: (#7192, #8192 or #8193) and #6258. Corequisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

#### MODEL CONVERSIONS

Model upgrade from 3090 Model 400 to 3090 Model 600E is field installable and the parts removed or replaced become the property of IBM and must be returned. Model downgrade from 3090 Model 400 to 3090 Model 200 is not recommended.

**Note:** Any 3090 Model 400 upgrade to a 3090 Model 600E requires that feature codes #7330 and #7331 be installed prior to, or as part of the upgrade. The prices of these features are in addition to the upgrade price. Also required are changes to the 3097. 3090 feature code addition or deletion must conform to symmetry requirements. Feature additions and deletions on the 3090 Model 400 should be ordered separately from any model upgrade MES unless adding a Vector Facility or Additional Central Storage.

#### ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator workstation for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cables may be concealed by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,780mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for willow green, #9162 for garnet rose, #9163 for sunrise yellow, #9164 for classic blue, #9165 for charcoal brown, #9166 for pebble gray, or #9167 for pearl white.

#### SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODELS 150 and 180

### PURPOSE

Provides arithmetic, logic and control function through a single integrated central processor with an optional Vector Facility and houses central storage, and channels for the 3090 Models 150 and 180. Also houses optional expanded storage for a Model 180.

### MODELS

**Model 150:** 33,554,432 (bytes) Central Storage, standard -- 67,108,864 (bytes) Central Storage, full configuration.

**Model 180:** 33,554,432 (bytes) Central Storage, standard -- 67,108,864 (bytes) Central Storage, full configuration.

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Model Differences:** The two uniprocessor models of the 3090 Processor Complex are identical in function but vary in instruction execution rate ratio.

**Prerequisites:** Each 3090 Model 150 or 180 Processor Unit requires:

1. One 3092 Model 1 Processor Controller.
2. One 3097 Model 1 or 2 Power and Coolant Distribution Unit.
3. Model 150: One 3089 Model 3 Power Unit or other appropriate 400 Hz power source, or Model 180: One 3089 Model 3 Power Unit or other appropriate 400 Hz power source is required except for a configuration consisting of either 192Mb of Expanded Storage and a Vector Facility or 256Mb of Expanded Storage and a Vector Facility, which requires two.
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
5. Two 3180 Model 140 Display Stations.
6. A 4800 bps switched network modem supporting an autocall/autoanswer feature.
7. Access to a path of a customer tape control unit operation in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 1 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. Access to a 3274 Model X1B and X1D, or the availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also needed for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 33,554,432 bytes of monolithic central storage, standard -- an additional 33,554,432 bytes of central storage is available -- a single integrated central processor with 18.5 nanoseconds cycle time -- 8-byte data flow between the processor and storage -- 65,536 byte high speed buffer -- optional vector facility for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set -- Start Interpretive Execution (SIE) assist.

**Standard Features:** 370-XA mode -- S/370 mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- sorting instructions.

**Central Storage:** 33,554,432 bytes of central storage are standard. An additional 33,554,432 bytes is available for a total of 67,108,864 bytes.

**Expanded Storage:** (Available only on Model 180) Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments of 64Mb up to a maximum of 256Mb.

**Vector Facility:** The optional Vector Facility enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum each cycle.

**Channels:** A total of 16 channels are standard on Model 150 and Model 180. One additional group of eight block multiplexer channels is optionally available on Model 150 for a total of 24 channels. Two additional groups of eight block multiplexer channels are optionally available on Model 180 for a total of 32 channels. Up to four channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode, channels may be grouped into two logical channel sets, with up to 32 channels to a set (up to 24 on Model 150), one set assignable to the central processor. In S/370 mode, channels may be given any valid logical designation.

In 370/XA mode the processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the channel paths. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):
  - 50 Hz: #2807, for 200V, #2815 for 220V, #2816 for 380V, #2825 for 400V, #2826 for 415V
  - 60 Hz: #2733 for 200V, #9903 for 208V, #2800 for 220V, #9915 for 240V, #2824 for 380V
- Color: #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.
- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 1 Processor Controller attached to this 3090 Processor Unit is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3, 865mm wide by 1795mm long (34 in. by 70.5 in.), the largest frame, require reduction of length, specify #9573. Specify code #9573 reduces frame 3 length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820mm (32 in.) wide by 1525mm (60 in.) long, specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3, and 5 by removal of cover/hardware. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 lbs. and may require partial depopulation of 3090 frames to satisfy this limitation. Specify #9581 to reduce frame 2 and frame 3 weights to less than 1,136kg/ 2,500 lbs. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Remote Support Facility (RSF): The capability for using the RSF remote service/logout analysis is standard and provided by the 3092 Processor Controller.
- Machine Nomenclature: #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

### 3090 Account Universal Lift Tool: Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

### SPECIAL FEATURES

**Vector Facility (#1545):** Provides the vector facility capability for the central processor. See M3097 pages. Maximum: One. Field Installation: Yes. Prerequisite: #7330.

**Channel Group, First Add'l (#3848):** Provides the first additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Channel Group, Second Add'l (#3849):** Model 180 only. Provides the second additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3848.

**Central Storage (#4064):** Provides an additional 32Mb of central storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb (#5064):** Model 180 only. Provides the first 64Mb increment of expanded storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 128Mb (#5128)** Model 180 only.: Provides the first 128Mb increment of expanded storage. Cannot be ordered with #5064. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 192Mb (#5192):** Model 180 only. Provides the first 192Mb increment of expanded storage. Cannot be ordered with #5064, or #5128. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 256Mb (#5256):** Model 180 only. Provides 256Mb increment of expanded storage. Cannot be ordered with #5064, #5128, or #5192. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, Add'l Increments:** Model 180 only. Provide upgrades of expanded storage. Order by MES only. Maximum: One feature. Field Installation: Yes. Prerequisites: Yes. Installed feature. See table below.

Installed		Upgrade Configuration			
Feature	Code	64Mb	128Mb	192Mb	256Mb
0 Mb		#5064	#5128	#5192	#5256
64Mb	#5064	-	#6128	#6192	#6256
128Mb	#5128 or #6128	-	-	#6193	#6257
192Mb	#5192 or #6192 or #6193	-	-	-	#6258

**Note:** Parts removed or replaced during field installation of features #6128, #6256, or #6258 become the property of IBM and must be returned.

**Expansion Frame (#7330):** Provides the housing for the 3090 Vector Facility (#1545). Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #1545.

### MODEL CONVERSIONS

Model upgrades from 3090 Model 150 to 3090 Model 180, from 3090 Model 150 to 3090 Model 180E, from 3090 Model 180 to 3090 Model 200 and from 3090 Model 180 to 3090 Model 200E are field installable. The parts removed or replaced during a 3090 Model 150 to 3090 Model 180, 3090 Model 150 to 3090 Model 180E or 3090 Model 180 to 3090 Model 200E upgrade become the property of IBM and must be returned. Model downgrades are not recommended. Note: Any 3090 Model 180 upgrade to Model 200 or Model 200E will require installation of features #3848, #3849 and #4064, on the Model 180 in order to meet the minimum channel and central storage configuration of a 3090 Model 200. The price of these features (if not already installed) must be added to the price of the model conversion. Installation of these features on the 3090 Model 180 is a prerequisite to upgrading. Model conversions from 3090 Model 150 to 3090 Model 200E will require feature code changes on the 3097. Feature changes or additions on the Model 150 or 180 should be ordered separately from any model upgrade MES from Model 150 to Model 180 or Model 180 to Model 200. Feature changes or additions on the Model 150 or 180 should be ordered separately from any model upgrade MES from Model 150 to Model 180E or Model 180 to Model 200E unless adding a Vector Facility or additional Central Storage. An additional 3089 Power Unit Model 3 or other appropriate 400 Hz power source, may be required for a Model 180 to Model

200 upgrade, or a Model 180 to Model 200E upgrade. See M3097 pages for the proper power specify code needed on the 3097.

## ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator workstation for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a

surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

## SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODEL 150E

### PURPOSE

Provides arithmetic, logic and control function through a single integrated central processor with an optional Vector Facility and houses central storage, expanded storage and channels for the 3090 Model 150E.

### MODELS

**Model 150E 15E:** 33,554,432 (bytes) Central Storage, standard -- 67,108,864 (bytes) Central Storage, full configuration.

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 150E Processor Unit requires:

1. One 3092 Model 1 Processor Controller.
2. One 3097 Model 1 or 2 Power and Coolant Distribution Unit.
3. One 3089 Model 3 Power Unit or other appropriate 400 Hz power source.
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
5. Two 3180 Model 140 Display Stations, or equivalent.
6. A 4800/2400 bps switched network modem supporting an autoanswer feature and an auto-call unit.
7. Access to a path of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 1 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. The tape drives that are supported are 3420 Models 4, 6, and 8, and the 3480 Models B11 and B22, or drives that are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. The availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also required for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 33,554,432 bytes of monolithic central storage, standard -- an additional 33,554,432 bytes of central storage is available -- a single integrated central processor with 17.75 nanoseconds cycle time -- 8-byte data flow between the processor and storage -- 65,536 byte high speed buffer -- optional vector facility for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set (24 on 150E) -- enhanced Start

Interpretive Execution (SIE) -- Multiple High Performance Guests Support: Optional Multiple High Performance Guests Support feature provides support for the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- S/370 mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- sorting instructions.

**Central Storage:** 33,554,432 bytes of central storage are standard. An additional 33,554,432 bytes is available for a total of 67,108,864 bytes.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments of 64Mb up to a maximum of 128Mb.

**Vector Facility:** The optional Vector Facility enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 16 channels are standard. One additional group of eight block multiplexer channels is optional, providing for a total of 24 channels. Up to four channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode, channels may be grouped into two logical channel sets, with up to 24 channels to a set, one set assignable to the central processor. In S/370 mode, channels may be given any valid logical designation.

In 370/XA mode the processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 24 channel paths. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- **Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):**
  - 50 Hz: #2807, for 200V, #2815 for 220V, #2816 for 380V, #2825 for 400V, #2826 for 415V
  - 60 Hz: #2733 for 200V, #9903 for 208V, #2800 for 220V, #9915 for 240V
- **Color:** #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.

- **Tape Drive:** Specify #9201 if the tape drive being used by the 3092 Model 1 Processor Controller attached to this 3090 Processor Unit is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- **Shipping Instructions:** (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3, 865mm wide by 1795mm long (34 in. by 70.5 in.), the largest frame, require reduction of length, specify #9573. Specify code #9573 reduces frame 3 length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820mm (32 in.) wide by 1525mm (60 in.) long, specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3, and 5 by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- **Machine Nomenclature:** #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

**3090 Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

**SPECIAL FEATURES**

**Vector Facility (#1545):** Provides the vector facility capability for the central processor. Prerequisites: Specify #7330 Maximum: One. Field Installation: Yes.

**Channel Group, First Add'l (#3848):** Provides the first additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Central Storage (#4064):** Provides an additional 32Mb of central storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb (#5064):** Provides the first 64Mb increment of expanded storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 128Mb (#5128):** Provides the first 128Mb increment of expanded storage. Cannot be ordered with #5064. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb to 128Mb (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage. Order by MES only. Prerequisites: #5064 Corequisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Multiple High Performance Guests Support, (#6851):** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests on the 3090 Model 150E. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Frame (#7330):** Provides the housing for the 3090 Vector Facility (#1545). Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisite: #1545

**MODEL CONVERSIONS**

Model upgrades from 3090 Model 150E to 3090 Model 180E are field installable. The parts removed or replaced become the property of IBM and must be returned. Model downgrades are not available.

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installation of the appropriate features on the additional Central Processors (CPs).

**ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator workstation for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

**SUPPLIES (NONE)**

## 3090 PROCESSOR UNIT MODEL 180E

### PURPOSE

Provides arithmetic, logic and control function through a single integrated central processor with an optional Vector Facility and houses central storage, expanded storage and channels for the 3090 Model 180E.

### MODELS

**Model 180E 18E:** 33,554,432 (bytes) Central Storage, standard -- 67,108,864 (bytes) Central Storage, full configuration.

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 180E Processor Unit requires:

1. One 3092 Model 1 Processor Controller
2. One 3097 Model 1 or 2 Power and Coolant Distribution Unit,
3. One 3089 Model 3 Power Unit, two if the configuration consists of 192Mb or greater of Expanded Storage and a Vector Facility or other appropriate 400 Hz power source.
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
5. Two 3180 Model 140 Display Stations, or equivalent.
6. A 4800/2400 bps switched network modem supporting autoanswer feature and an auto-call unit.
7. Access to a path of a customer tape control unit operation in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 1 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. The availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also required for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 33,554,432 bytes of monolithic central storage -- one integrated central processor with a cycle time of (17.2) nanoseconds -- 8-byte data flow between the processor and storage -- 65,536 byte high speed buffer -- optional vector facility for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set -- enhanced Start Interpretive

Execution (SIE) -- Multiple High Performance Guests Support: Optional Multiple High Performance Guests Support feature provides support for the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- S/370 mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- sorting instructions.

**Central Storage:** 33,554,432 bytes of central storage are standard. An additional 33,554,432 bytes are available for a total of 67,108,864 bytes.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments of 64Mb up to a maximum of 256Mb.

**Vector Facility:** The optional Vector Facility enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 16 channels are standard. Two additional groups of eight block multiplexer channels each are optional, providing for a total of up to 32 channels. Up to 4 channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode, channels may be grouped into two logical channel sets, with up to 32 channels to a set, one set assignable to the central processor. In S/370 mode, channels may be given any valid logical designation.

In 370/XA mode the processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 32 channel paths. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Color: #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.
- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 1 Processor Controller attached to this 3090 Processor Unit is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. (See M3092 pages for additional information.)
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3 . 865mm wide by 1795mm long (34 in. by 70.5 in.), the largest frame, require reduction of length, specify #9573. Specify code #9573 reduces frame 3 length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820 mm (32 in.) wide by 1525mm (60 in.) long, specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3 and 5 by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Machine Nomenclature: #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

#### 3090 Account Universal Lift Tool: Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If the 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

#### SPECIAL FEATURES

**Vector Facility (#1545):** Provides the vector facility capability to the central processor. Prerequisites: #7330 Maximum: One. Field Installation: Yes.

**Note:** If configuration contains 192Mb or greater Expanded storage and a Vector Facility, a second 3089 or equivalent source of power is required.

**Channel Group, First Add'l (#3848):** Provides the first additional group of 8-block multiplexer channels. Maximum: One. Field installation: Yes. Prerequisites: None.

**Channel Group, Second Add'l (#3849):** Provides the second additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3848.

**Central Storage (#4064):** Provides an additional 32Mb of central storage. Maximum: One. Field installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb (#5064):** Provides the first 64Mb increment of expanded storage. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb (#5128):** Provides 128Mb of expanded storage. Cannot be ordered with #5064. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb (#5192):** Provides 192Mb of expanded storage. Cannot be ordered with #5064 or #5128. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes. (See Note 1)

**Expanded Storage, 256Mb (#5256):** Provides 256Mb of expanded storage. Cannot be ordered with #5064, #5128 or #5192. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes. (See Note 1)

**Expanded Storage, 64Mb to 128Mb (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes. (See Note 1)

**Expanded Storage, 64Mb to 256Mb (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes. (See Note 1)

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes. (See Note 1)

**Expanded Storage, 128Mb to 256Mb (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes. (See Note 1)

**Expanded Storage, 192Mb to 256Mb (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

#### Notes:

1. If configuration contains the Vector Facility (#1545) and 192Mb of Expanded Storage or greater, then a second 3089 or equivalent source of power is required.

**Multiple High Performance Guests Support, (#6851):** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests on the 3090 Model 180E. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expansion Frame, (#7330):** Provides the housing for the 3090 Vector Facility, (#1545). Maximum: One. Field Installation: Yes. Pre-requisites: None. Corequisites: #1545

#### MODEL CONVERSIONS

Model upgrades from 3090 Model 180E to 3090 Model 200E are field installable. Model downgrades are not available.

**Note:** Any 3090 Model 180E upgrade to Model 200E will require installation of features #3848, #3849 and #4064 on the Model 180E in order to meet the minimum channel and central storage configuration on a 3090 Model 200E. The price of these features (if not already installed) must be added to the price of the model conversion. Installation of these features on the 3090 Model 180E is a prerequisite to upgrading. An additional 3089 Power Unit Model 3 or other appropriate 400 Hz power source, may be required for a Model 180E to Model 200E upgrade. See M3097 pages for the proper power specify code needed on the 3097.

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installa-

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tion of the appropriate features on the additional Central Processors (CPs).

## ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator work station for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a

surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

## SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODEL 200E

### PURPOSE

Provides arithmetic, logic and control function through two integrated central processors with optional Vector Facilities and houses shared central storage, expanded storage and channels for the 3090 model 200E.

### MODELS

**Model 200E 20E:** 67,108,864 (bytes) Central Storage, standard -- 134,217,728 (bytes) Central Storage, full configuration.

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 200E Processor Unit requires:

1. One 3092 Model 1 Processor Controller.
2. One 3097 Model 1 or 2 Power and Coolant Distribution Unit.
3. Two 3089 Model 3 Power Units or other appropriate 400 Hz power source.
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
5. Two 3180 Model 140 Display Stations, or equivalent.
6. A 4800/2400 bps switched network modem supporting autoanswer feature and an auto-call unit.
7. Access to a path of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 1 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GG22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. The availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also required for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 67,108,864 bytes of monolithic central storage -- Two integrated central processors each having a cycle time of (17.2) nanoseconds -- 8-byte data flow between each processor and storage -- Each processor has its own 65,536 byte high speed buffer -- optional vector facilities for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set -- enhanced Start Interpretive Execution (SIE) -- Multiple

High Performance Guests Support: Optional Multiple High Performance Guests Support feature provides support for the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- S/370 mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- sorting instructions.

**Central Storage:** 67,108,864 bytes of central storage are standard. An additional 67,108,864 bytes are available for a total of 134,217,728 bytes.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments up to a maximum of 1024Mb.

**Vector Facility:** The Vector Facility, optionally available for each of the central processors, enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 32 channels are standard. Two additional groups of eight block multiplexer channels each and one additional group of 16 block multiplexer channels are optional, providing for a total of up to 64 channels. Up to four channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically address up to eight control units. (See "Special Features" section.)

In S/370 mode, channels may be grouped into two logical channel sets, with up to 32 channels to a set, one set assignable to each central processor. Channel set switching is standard. In S/370 mode, channels may be given any valid logical designation.

In 370-XA mode, any processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 64 channel paths. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

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- Color: #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.
- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 1 Processor Controller attached to this 3090 Processor Unit is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3, (865mm wide by 1795mm long (34 in. by 70.5 in.) the largest frame) require reduction of length, specify #9573. Specify code #9573 reduces frame 3 length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820mm (32 in.) wide by 1525mm (60 in.) long, specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3 and 5 by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 pounds and may require partial depopulation of 3090 frames to satisfy this limitation. Specify #9581 to reduce frame 2 and frame 3 weights to less than 1,136kg/2,500 pounds. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Machine Nomenclature: #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

**3090 Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

**SPECIAL FEATURES**

**Vector Facility, First (#1545):** Provides the vector facility capability to the first central processor. Prerequisites: #7330 Maximum: One. Field Installation: Yes.

**Vector Facility, Second (#1550):** Provides the vector facility capability to the second central processor. Prerequisites: #1545. Maximum: One. Field Installation: Yes.

**Channel Group, First Add'l (#3850):** Provides the first additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Channel Group, Second Add'l (#3851):** Provides the second additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3850.

**Channel Group, Third Add'l (#3854):** Provides an additional group of 16-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3851, #7330.

**Central Storage, (#4128):** Provides an additional 64Mb of central storage. Maximum: One. Field Installation: Yes. Prerequisites: None

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb (#5064):** Provides the first 64Mb increment of expanded storage. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb (#5128):** Provides 128Mb of expanded storage. Cannot be ordered with #5064. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb (#5192):** Provides 192Mb of expanded storage. Cannot be ordered with #5064 or #5128. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256Mb (#5256):** Provides 256Mb of expanded storage. Cannot be ordered with #5064, #5128 or #5192. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 512Mb (#5512):** Provides 512Mb of expanded storage. Cannot be ordered with #5064, #5128, #5192 or #5256. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes

**Expanded Storage, 1024Mb (#5024):** Provides 1024Mb of expanded storage. Cannot be ordered with #5064, #5128, #5192, #5256, or #5512. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 512Mb (#6512):** Provides an upgrade from 64Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 512Mb (#6513):** Provides an upgrade from 128Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 256Mb (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 512Mb (#6514):** Provides an upgrade from 192Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 256Mb to 512Mb (#6515):** Provides an upgrade from 256Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5256 or #6256 or #6257 or #6258. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 512Mb to 1024Mb (#6026):** Provides an upgrade from 512Mb to 1024Mb of expanded storage. Order by MES only. Prerequisites: #5512 or #6512 or #6513 or #6514 or #6515. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Multiple High Performance Guests Support:** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests. The following features are required on the 3090 Model 200E:

- #6851 Multiple High Performance Guests Support on CP-1
- #6852 Multiple High Performance Guests Support on CP-2

Maximum: One each. Field Installation: Yes. Prerequisites: None.

**Expansion Frame (#7330):** Provides the housing for the first and second 3090 Vector Facilities, (#1545, #1550), and for the third additional 3090 Channel Group (#3854). Required for the installation of #1545 and #3854. Maximum: One. Field Installation: Yes. Pre-requisites: None. Corequisites: #1545 or #3854

#### MODEL CONVERSIONS

Model upgrades from 3090 Model 200E to 3090 Model 300E and from 3090 Model 200E to 3090 Model 400E are field installable. Model downgrades are not available.

**Note:** Any 3090 Model 200E upgrade to Model 400E may require installation of features on the 200E in order to provide symmetry in channels, main storage and expanded storage on the 3090 Model 400E. Installation of these features on the 3090 Model 200E is a prerequisite to upgrading. Any 3090 Model 200E upgrade to Model 300E requires that feature #7330 be installed prior to, or as part of the upgrade. The price of this feature is in addition to the upgrade price. Parts removed or replaced during field installation become the property of IBM and must be returned.

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installation of the appropriate features on the additional Central Processors (CPs).

#### ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator work station for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

#### SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODEL 300E

### PURPOSE

Provides arithmetic, logic and control function through three integrated central processors with optional Vector Facilities and houses shared central storage, expanded storage and channels for the 3090 model 300E.

### MODELS

**Model 300E 30E:** 67,108,864 (bytes) Central Storage, standard -- 134,217,728 (bytes) Central Storage, full configuration.

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 300E Processor Unit requires:

1. One 3092 Model 1 Processor Controller.
2. One 3097 Model 1 or 2 Power and Coolant Distribution Unit.
3. Two 3089 Model 3 Power Units or other appropriate 400 Hz power source.
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
5. Two 3180 Model 140 Display Stations, or equivalent.
6. A 4800/2400 bps switched network modem supporting autoanswer feature and an auto-call unit.
7. Access to a path of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 1 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GG22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. The availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also required for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 67,108,864 bytes of monolithic central storage -- Three integrated central processors each having a cycle time of (17.2) nanoseconds -- 8-byte data flow between each processor and storage -- Each processor has its own 65,536 byte high speed buffer -- optional vector facilities for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- enhanced Start Interpretive Execution (SIE) -- Multiple High Performance Guests Support : Optional Multiple High Performance Guests Support feature provides support for

the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- Universal Instruction Set -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- data streaming -- sorting instructions.

**Central Storage:** 67,108,864 bytes of central storage are standard. An additional 67,108,864 bytes are available for a total of 134,217,728 bytes.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments up to a maximum of 1024MB.

**Vector Facility:** The Vector Facility optionally available for each of the central processors enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 32 channels are standard. Two additional groups of eight block multiplexer channels each and one additional group of 16 block multiplexer channels are optional, providing for a total of up to 64 channels. Up to four channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In 370-XA mode, any processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 64 channel paths. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Color: #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.
- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 1 Processor Controller attached to this 3090 Processor Unit is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.

- **Shipping Instructions:** (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3, 865mm wide by 1795mm long (34 in. by 70.5 in.), the largest frame, require reduction of length, specify #9573. Specify code #9573 reduces frame 3 length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820mm (32 in.) wide by 1525mm (60 in.) long, specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3 and 5 by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- **Weight Considerations:** (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 pounds and may require partial depopulation of 3090 frames to satisfy this limitation. Specify #9581 to reduce frame 2 and frame 3 weights to less than 1,136kg/2,500 pounds. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- **Machine Nomenclature:** #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

**3090 Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

**SPECIAL FEATURES**

**Vector Facility, First (#1545):** Provides the vector facility capability to the first central processor. Prerequisites: None. Maximum: One. Field Installation: Yes.

**Vector Facility, Second (#1550):** Provides the vector facility capability to the second central processor. Prerequisites: #1545. Maximum: One. Field Installation: Yes.

**Vector Facility, Third (#1555):** Provides the vector facility capability to the third central processor. Prerequisites: #1550 Maximum: One. Field Installation: Yes.

**Channel Group, First Add'l (#3850):** Provides the first additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Channel Group, Second Add'l (#3851):** Provides the second additional group of 8-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3850.

**Channel Group, Third Add'l (#3854):** Provides an additional group of 16-block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: #3851.

**Central Storage, (#4128):** Provides an additional 64Mb of central storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb (#5064):** Provides the first 64Mb increment of expanded storage. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb (#5128):** Provides 128Mb of expanded storage. Cannot be ordered with #5064. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb (#5192):** Provides 192Mb of expanded storage. Cannot be ordered with #5064 or #5128. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256Mb (#5256):** Provides 256Mb of expanded storage. Cannot be ordered with #5064, #5128 or #5192. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 512Mb (#5512):** Provides 512Mb of expanded storage. Cannot be ordered with #5064, #5128, #5192 or #5256. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 1024Mb (#5024):** Provides 1024Mb of expanded storage. Cannot be ordered with #5064, #5128, #5192, #5256, or #5512. Prerequisites: None. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage. Order by MES only. Prerequisites: #5064 Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 512Mb (#6512):** Provides an upgrade from 64Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5064. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 512Mb (#6513):** Provides an upgrade from 128Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 256Mb (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 512Mb (#6514):** Provides an upgrade from 192Mb to 512Mb of expanded storage. Order by MES only.

## MACHINES

Prerequisites: #5192 or #6192 or #6193. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 256Mb to 512Mb (#6515):** Provides an upgrade from 256Mb to 512Mb of expanded storage. Order by MES only. Prerequisites: #5256 or #6256 or #6257 or #6258. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 512Mb to 1024Mb (#6028):** Provides an upgrade from 512Mb to 1024Mb of expanded storage. Order by MES only. Prerequisites: #5512 or #6512 or #6513 or #6514 or #6515. Co-requisite: None. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

The Expansion Frame is a standard feature on the Model 300E.

**Multiple High Performance Guests Support:** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests. The following features are required on the 3090 Model 300E:

- #6851 Multiple High Performance Guests Support on CP-1
- #6852 Multiple High Performance Guests Support on CP-2
- #6853 Multiple High Performance Guests Support on CP-0

Maximum: One each. Field Installation: Yes. Prerequisites: None.

## MODEL CONVERSIONS

Model upgrades from 3090 Model 300E to 3090 Model 600E are field installable. The parts removed or replaced become the property of IBM and must be returned. Model downgrades are not available.

**Note:** Any 3090 Model 300E upgrade to Model 600E may require installation of features on the 300E in order to provide symmetry in channels, main storage and expanded storage on the Model 600E. Installation of these features on the 3090 Model 300E is a prerequisite to upgrading.

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installation of the appropriate features on the additional Central Processors (CPs).

## ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator work station for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

## SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODEL 400E

### PURPOSE

Provides arithmetic, logic and control function through four integrated central processors with optional Vector Facilities and houses shared central storage, expanded storage and channels for the 3090 model 400E. Available as a 3090 Processor Unit Model 400E and by MES to upgrade a 3090 Model 200, or 200E to a Model 400E.

### MODELS

**Model 400E 40E:** 268,435,456 (bytes) Central Storage, full configuration.

**Note:** At initial microcode load time, a minimum of 576K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 400E Processor Unit requires:

- One 3092 Model 2 Processor Controller.
- Two 3097 Model 1 or 2 Power and Coolant Distribution Units; two 3097 Model 1s, two Model 2s, or one Model 1 and one Model 2 can be used. I/O power sequence controls are provided on the 3097 Model 1, otherwise both Models provide the same functions.
- Four 3089 Model 3 Power Units or other appropriate 400 Hz power source.
- Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
- Three 3180 Model 140 Display Stations, or equivalent.
- Two 4800/2400 bps switched network modems each supporting autoanswer feature and an auto-call unit.
- Access to two paths of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GG22-7074.

The system control program requires appropriate operator stations in single image a minimum of one and in partitioned mode a minimum of two operator stations are required in addition to the 3180 system and service support display stations. The availability of an operator console is required for each partition to satisfy the minimum service configuration. Access to a tape drive is also required from each partition for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 134,217,728 bytes of monolithic central storage -- four integrated central processors each having a cycle time of (17.2) nanoseconds -- 8-byte data flow between each processor and storage -- each processor has its own 65,536 byte high speed buffer --

optional vector facilities for greatly increasing the processor's engineering and scientific processing capabilities -- Concurrent repair of a hardware partition is the normal maintenance procedure -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode (when Partitioned) or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set -- enhanced Start Interpretive Execution (SIE) -- Multiple High Performance Guests Support : Optional Multiple High Performance Guests Support feature provides support for the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- S/370 mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- sorting instructions.

**Central Storage:** 134,217,728 bytes of central storage are standard. An additional 134,217,728 bytes are available for a total of 268,435,456 bytes.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments up to a maximum of 2048MB.

**Vector Facility:** The Vector Facility optionally available for each of the central processors enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 64 channels are standard, 32 channels on the A-side and 32 channels on the B-side. Two additional groups of 16 block multiplexer channels each, eight on the A-side and eight on the B-side, and one additional group of 32 block multiplexer channels, sixteen on the A-side and sixteen on the B-side, are optional, providing for a total of up to 128 channels. Up to eight channels (four on each side) may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode (when the 400E is in Physical Partitioned Mode), channels may be grouped into logical channel sets with up to 32 channels to a set, one assignable to each central processor. Channel set switching is standard. In S/370 mode, channels may be given any valid logical designation.

In 370-XA mode, any processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 128 channel paths in single-image mode or any of the 64 channel paths in partitioned mode. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

**MACHINES**

3090 Model 400E Tightly Coupled Multiprocessing: The normal operation of the 3090 Model 400E is in 370-XA mode under control of a single control program through a single operational interface. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without an IPL or IML. The continuing subsystem may consist of either half of the 3090 Model 400E. This provides very high availability of the surviving portion of the processor complex. When run in single-image mode, the 3090 Model 400E may operate only in 370-XA mode.

The 3090 Model 400E may also be partitioned into two independent dyadic processors. The resultant dyadic configurations may be operated independently of each other in either 370-XA or S/370 mode.

**SPECIFY**

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Color: #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.
- Tape Drive: Specify #9201 if the tapes drives being used by the 3092 Model 2 Processor Controller attached to this 3090 Processor Unit are 3420 Models 4, 6 or 8 or equivalent, or #9202 if the tape drives are 3480 Models B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3 (13), 865mm wide by 1795mm long (34 in. by 70.5 in.), the largest frame, require reduction of length, specify #9573 (#9673). Specify code #9573 (#9673) reduces frame 3 (13) length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820mm (32 in.) wide by 1525mm (60 in.) long, specify #9571 (#9671). Specify code #9571 (#9671) reduces the external dimensions of frames 1 (11), 2 (12), 3 (13) and 5 (15) by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. Specify code #9673 is a prerequisite to #9671. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 pounds and may require partial depopulation of 3090 frames to satisfy this limitation. Specify #9581 (#9681) to reduce frame 2 (12) and frame 3 (13) weights to less than 1,136kg/2,500 pounds. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Machine Nomenclature: #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

**3090 Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.

2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

**SPECIAL FEATURES**

**Vector Facility, First, A-Side (#1545):** Provides the vector facility capability to the first central processor on the A-side. Prerequisites: #7330. Maximum: One. Field Installation: Yes.

**Vector Facility, Second, A-Side (#1550):** Provides the vector facility capability to the second central processor on the A-side. Prerequisites: #1545. Maximum: One. Field Installation: Yes.

**Vector Facility, First, B-Side (#1546):** Provides the vector facility capability to the first central processor on the B-side. Prerequisites: #7331. Maximum: One. Field Installation: Yes.

**Vector Facility, Second, B-Side (#1551):** Provides the vector facility capability to the second central processor on the B-side. Prerequisites: #1546. Maximum: One. Field Installation: Yes.

**Channel Group, First Add'l, A-side (#3850):** Provides the first additional group of 8-block multiplexer channels on the A-side. Maximum: One. Field Installation: Yes. Prerequisites: None. Co-requisite: #3852.

**Channel Group, Second Add'l, A-side (#3851):** Provides the second additional group of 8-block multiplexer channels on the A-side. Maximum: One. Field Installation: Yes. Prerequisites: #3850. Co-requisite: #3853.

**Channel Group, Third Add'l, A-side (#3854):** Provides an additional group of 8-block multiplexer channels on the A-side. Maximum: One. Field Installation: Yes. Prerequisites: #3851, #7330. Co-Requisite: #3856, #7331.

**Channel Group, First Add'l, B-side (#3852):** Provides the first additional group of 8-block multiplexer channels on the B-side. Maximum: One. Field Installation: Yes. Prerequisites: None. Co-requisite: #3850.

**Channel Group, Second Add'l, B-side (#3853):** Provides the second additional group of 8-block multiplexer channels on the B-side. Maximum: One. Field Installation: Yes. Prerequisites: #3852. Co-requisite: #3851.

**Channel Group, Third Add'l, B-side (#3856):** Provides an additional group of 16-block multiplexer channels on the B-side. Maximum: One. Field Installation: Yes. Prerequisites: #3853, #7331. Co-requisite: #3854, #7330.

**Central Storage, A-Side, (#4128):** Provides an additional 64Mb of central storage. Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #4228 on B-Side.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Central Storage, B-Side, (#4228):** Provides an additional 64Mb of central storage. Maximum: One. Field Installation: Yes. Corequisites: #4128 on A-Side.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expand Storage, 64MB-A Side (#5064):** Provides the first 64Mb increment of expanded storage on the A-side. Prerequisites: None. Co-requisite: #7064. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb - A Side (#5128):** Provides 128Mb of expanded storage on the A-side. Cannot be ordered with #5064. Prerequisites: None. Co-requisite: #7128. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb - A Side (#5192):** Provides 192Mb of expanded storage on the A-side. Cannot be ordered with #5064 or #5128. Prerequisites: None. Co-requisite: #7192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256Mb - A Side (#5256):** Provides 256Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128 or #5192. Prerequisites: None. Co-requisite: #7256. Maximum: One. Field Installation: Yes.

**Expanded Storage, 512Mb - A Side (#5512):** Provides 512Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128, #5192 or #5256. Prerequisites: None. Co-requisite: #7512. Maximum: One. Field Installation: Yes.

**Expanded Storage, 1024Mb - A Side (#5024):** Provides 1024Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128, #5192, #5256, or #5512. Prerequisites: None. Co-requisite: #7024. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb - A Side (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064 Co-requisite: #7128 or #8128. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb - A-Side (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064. Co-requisite: #7192 or #8192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb - A-Side (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064. Co-requisite: #7256 or #8256. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 512Mb - A-Side (#6512):** Provides an upgrade from 64Mb to 512Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064. Co-requisite: #7512 or #8512. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb - A-Side (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: #7192 or #8193. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb - A-Side (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: #7256 or #8257. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 512Mb - A-Side (#6513):** Provides an upgrade from 128Mb to 512Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: #7512 or #8513. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 256Mb - A-Side (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: #7256 or #8258. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 512Mb - A-Side (#6514):** Provides an upgrade from 192Mb to 512Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5192 or #6192 or #6193.

Co-requisite: #7512 or #8514. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 256Mb to 512Mb - A-Side (#6515):** Provides an upgrade from 256Mb to 512Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5256 or #6256 or #6257 or #6258. Co-requisite: #7512 or #8515. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 512Mb to 1024Mb - A-Side (#6028):** Provides an upgrade from 512Mb to 1024Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5512 or #6512 or #6513 or #6514 or #6515. Co-requisite: #7024 or #8028. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Multiple High Performance Guests Support:** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests. The following features are required on the 3090 Model 400E:

- #6851 Multiple High Performance Guests Support on CP-1
- #6852 Multiple High Performance Guests Support on CP-2
- #7851 Multiple High Performance Guests Support on CP-3
- #7852 Multiple High Performance Guests Support on CP-4

Maximum: One each. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb - B-Side (#7064):** Provides the first 64Mb increment of expanded storage on the B-side. Prerequisites: None. Co-requisite: #5064. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb - B-Side (#7128):** Provides 128Mb of expanded storage on the B-side. Cannot be ordered with #7064. Prerequisites: None. Co-requisite: #5128. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb - B-Side (#7192):** Provides 192Mb of expanded storage on the B-side. Cannot be ordered with #7064 or #7128. Prerequisites: None. Co-requisite: #5192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256Mb - B-Side (#7256):** Provides 256-Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128 or #7192. Prerequisites: None. Co-requisite: #5256. Maximum: One. Field Installation: Yes.

**Expanded Storage, 512Mb - B-Side (#7512):** Provides 512Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128, #7192 or #7256. Prerequisites: None. Co-requisite: #5512. Maximum: One. Field Installation: Yes.

**Expanded Storage, 1024Mb - B-Side (#7024):** Provides 1024Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128, #7192, #7256 or #7512. Prerequisites: None. Co-requisite: #5024. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb - B-Side (#8128):** Provides an upgrade from 64Mb to 128Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064 Co-requisite: #5128 or #6128. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb - B-Side (#8192):** Provides an upgrade from 64Mb to 192Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064. Co-requisite: #5192 or #6192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb - B-Side (#8256):** Provides an upgrade from 64Mb to 256Mb of expanded storage on the B-Side.

Order by MES only. Prerequisites: #7064. Co-requisite: #5256 or #6256. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 512Mb - B-Side (#8512):** Provides an upgrade from 64Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064. Co-requisite: #5512 or #6512. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb - B-Side (#8193):** Provides an upgrade from 128Mb to 192Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7128 or #8128. Co-requisite: #5192 or #6193. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb - B-Side (#8257):** Provides an upgrade from 128Mb to 256Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7128 or #8128. Co-requisite: #5256 or #6257. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 512Mb - B-Side (#8513):** Provides an upgrade from 128Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7128 or #8128. Co-requisite: #5512 or #6513. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 256Mb - B-Side (#8258):** Provides an upgrade from 192Mb to 256Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7192 or #8192 or #8193. Co-requisite: #5256 or #6258. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 512Mb - B-Side (#8514):** Provides an upgrade from 192Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7192 or #8192 or #8193. Co-requisite: #5512 or #6514. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 256Mb to 512Mb - B-Side (#8515):** Provides an upgrade from 256Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7256 or #8256 or #8257 or #8258. Co-requisite: #5512 or #6515. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 512Mb to 1024Mb - B-Side (#8028):** Provides an upgrade from 512Mb to 1024Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7512 or #8512 or #8513 or #8514 or #8515. Co-requisite: #6028. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expansion Frame, A-side (#7330):** Provides the housing for the first and second 3090 Vector Facilities on the A-side (#1545, #1550) and for the third additional 3090 Channel Group in the A-side (#3854). Required for the installation of #1545 and #3854. Maximum: One. Field Installation: Yes. Pre-requisites: None. Corequisites: #1545 if installed for Vector or #3854, #3856 and #7331 if installed for #3854.

**Expansion Frame, B-side (#7331):** Provides the housing for the first and second 3090 Vector Facilities on the B-side (#1546, #1551) and for the third additional 3090 Channel Group in the B-side (#3856). Required for the installation of #1546 and #3856. Maximum: One. Field Installation: Yes. Pre-requisites: None. Corequisites: #1546 if installed for Vector or #3854, #3856 and #7330 if installed for #3856.

#### MODEL CONVERSIONS

Model upgrades from 3090 Model 400E to 3090 Model 600E are field installable. Model downgrades are not available.

**Note:** Any 3090 Model 400E upgrade to Model 600E requires that feature codes #7330 and #7331 be installed prior to, or as part of the upgrade. The price of these features is in addition to the upgrade price.

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installation of the appropriate features on the additional Central Processors (CPs).

#### ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator work station for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

#### SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODEL 600E

### PURPOSE

Provides arithmetic, logic and control function through six integrated central processors with optional Vector Facilities and houses shared central storage, expanded storage and channels for the 3090 model 600E. Available as a 3090 Processor Unit Model 600E and by MES to upgrade a 3090 Model 300E, 400 or 400E to a Model 600E.

### MODELS

**Model 600E 60E:** 134,217,728 (bytes) Central Storage, standard -- 268,435,456 (bytes) Central Storage, full configuration

**Note:** At initial microcode load time, a minimum of 576K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 600E Processor Unit requires:

1. One 3092 Model 2 Processor Controller.
2. Two 3097 Model 1 or 2 Power and Coolant Distribution Units, two 3097 Model 1s, two Model 2s, or one Model 1 and one Model 2 can be used. I/O power sequence controls are provided on the 3097 Model 1, otherwise both Models provide the same functions.
3. Four 3089 Model 3 Power Units or other appropriate 400 Hz power source.
4. Two 3370 Model A2 Direct Access Storage Units, each with the string switch feature (#8150).
5. Three 3180 Model 140 Display Stations, or equivalent.
6. Two 4800/2400 bps switched network modems each supporting autoanswer feature and an auto-call unit.
7. Access to two paths of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Processor Controller. If a tape drive with 10.5-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires appropriate operator stations, in single image a minimum of one and in partitioned mode a minimum of two operator stations are required, in addition to the 3180 system and service support display stations. The availability of an operator console is required for each partition to satisfy the minimum service configuration. Access to a tape drive is also required from each partition for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 134,217,728 bytes of monolithic central storage -- Six integrated central processors each having a cycle time of (17.2) nanoseconds -- 8-byte data flow between each processor and storage -- Each processor has its own 65,536-byte high speed buffer -- optional vector facilities for greatly increasing the processor's en-

gineering and scientific processing capabilities -- Concurrent repair of a hardware partition is the normal maintenance procedure -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- 370-XA mode provides for addressing up to two gigabytes and provides for microcode controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking enhanced Start Interpretive Execution (SIE) -- Multiple High Performance Guests Support : Optional Multiple High Performance Guests Support feature provides support for the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- Universal Instruction Set -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- data streaming -- sorting instructions.

**Central Storage:** 134,217,728 bytes of central storage are standard. An additional 134,217,728 bytes are available for a total of 268,435,456 bytes.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in increments up to a maximum of 2,048MB.

**Vector Facility:** The Vector Facility optionally available for each of the central processors enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 64 channels are standard, 32 channels on the A-side and 32 channels on the B-side. Two additional groups of 16 block multiplexer channels each, eight on the A-side and eight on the B-side, and one additional group of 32 block multiplexer channels, sixteen on the A-side and sixteen on the B-side, are optional, providing for a total of up to 128 channels. Up to eight channels (four on each side) may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In 370-XA mode, any processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 128 channel paths in single-image mode or any of the 64 channel paths in partitioned mode. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

**3090 Model 600E Tightly Coupled Multiprocessing:** The normal operation of the 3090 Model 600E is in 370-XA mode under control of a single control program through a single operational interface. Concurrent repair is the normal mode of maintenance.

The operator has the ability to reconfigure elements from the functioning configuration, create a maintenance subsystem, effect concurrent repair and return the repaired subsystem to the continuing configuration without an IPL or IML. The continuing subsystem may consist of either half of the 3090 Model 600E. This provides very high availability of the surviving portion of the processor complex. When run in single-image mode, the 3090 Model 600E may operate only in 370-XA mode.

The 3090 Model 600E may also be partitioned into two independent triadic processors.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire 50 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Color: #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9064 for Charcoal Brown, #9065 for Pebble Gray, or #9066 for Pearl White.
- Tape Drive: Specify #9201 if the tapes drives being used by the 3092 Model 2 Processor Controller attached to this 3090 Processor Unit are 3420 Models 4, 6 or 8 or equivalent, or #9202 if the tape drives are 3480 Models B11 or B22 or equivalent. Either #9201 or #9202 may be specified but not both. See M3092 pages for additional information.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3 (13), 865mm wide by 1795mm long (34 in. by 70.5 in.), the largest frame, require reduction of length, specify #9573 (#9673). Specify code #9573 (#9673) reduces frame 3 (13) length to 1590mm (62.5 in.) by removal of the tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction to 820mm (32 in.) wide by 1525mm (60 in.) long, specify #9571 (#9671). Specify code #9571 (#9671) reduces the external dimensions of frames 1 (11), 2 (12), 3 (13) and 5 (15) by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. Specify code #9673 is a prerequisite to #9671. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Weight Considerations: (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 pounds and may require partial depopulation of 3090 frames to satisfy this limitation. Specify #9581 (#9681) to reduce frame 2 (12) and frame 3 (13) weights to less than 1,136kg/2,500 pounds. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- Machine Nomenclature: #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

**3090 Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

### SPECIAL FEATURES

**Vector Facility, First, A-Side (#1545):** Provides the vector facility capability to the first central processor on the A-side. Prerequisites: None. Maximum: One. Field Installation: Yes.

**Vector Facility, Second, A-Side (#1550):** Provides the vector facility capability to the second central processor on the A-side. Prerequisites: #1545. Maximum: One. Field Installation: Yes.

**Vector Facility, Third, A-Side (#1555):** Provides the vector facility capability to the third central processor on the A-side. Prerequisites: #1550. Maximum: One. Field Installation: Yes.

**Vector Facility, First, B-Side (#1546):** Provides the vector facility capability to the first central processor on the B-side. Prerequisites: None. Maximum: One. Field Installation: Yes.

**Vector Facility, Second, B-Side (#1551):** Provides the vector facility capability to the second central processor on the B-side. Prerequisites: #1546. Maximum: One. Field Installation: Yes.

**Vector Facility, Third, B-Side (#1556):** Provides the vector facility capability to the third central processor on the B-side. Prerequisites: #1551. Maximum: One. Field Installation: Yes.

**Channel Group, First Add'l, A-side (#3850):** Provides the first additional group of 8-block multiplexer channels on the A-side. Maximum: One. Field Installation: Yes. Prerequisites: None. Co-requisite: #3852.

**Channel Group, Second Add'l, A-side (#3851):** Provides the second additional group of 8-block multiplexer channels on the A-side. Maximum: One. Field Installation: Yes. Prerequisites: #3850. Co-requisite: #3853.

**Channel Group, Third Add'l, A-side (#3854):** Provides an additional group of 16-block multiplexer channels on the A-side. Maximum: One. Field Installation: Yes. Prerequisites: #3851. Co-requisite: #3856.

**Channel Group, First Add'l, B-side (#3852):** Provides the first additional group of 8-block multiplexer channels on the B-side. Maximum: One. Field Installation: Yes. Prerequisites: None. Co-requisite: #3850.

**Channel Group, Second Add'l, B-side (#3853):** Provides the second additional group of 8-block multiplexer channels on the B-side. Maximum: One. Field Installation: Yes. Prerequisites: #3852. Co-requisite: #3851.

**Channel Group, Third Add'l, B-side (#3856):** Provides an additional group of 16-block multiplexer channels on the B-side. Maximum: One. Field Installation: Yes. Prerequisites: #3853. Co-requisite: #3854.

**Central Storage, A-Side, (#4128):** Provides an additional 64Mb of central storage. Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #4228 on B-Side.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Central Storage, B-Side, (#4228):** Provides an additional 64Mb of central storage. Maximum: One. Field Installation: Yes. Corequisites: #4128 on A-Side.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb - A-Side (#5064):** Provides the first 64Mb increment of expanded storage on the A-side. Prerequisites: None. Co-requisite: #7064. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb - A-Side (#5128):** Provides 128Mb of expanded storage on the A-side. Cannot be ordered with #5064. Prerequisites: None. Co-requisite: #7128. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb - A-Side (#5192):** Provides 192Mb of expanded storage on the A-side. Cannot be ordered with #5064 or #5128. Prerequisites: None. Co-requisite: #7192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256Mb - A-Side (#5256):** Provides 256Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128 or #5192. Prerequisites: None. Co-requisite: #7256. Maximum: One. Field Installation: Yes.

**Expanded Storage, 512Mb - A-Side (#5512):** Provides 512Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128, #5192 or #5256. Prerequisites: None. Co-requisite: #7512. Maximum: One. Field Installation: Yes.

**Expanded Storage, 1024Mb - A-Side (#5024):** Provides 1024Mb of expanded storage on the A-side. Cannot be ordered with #5064, #5128, #5192, #5256, or #5512. Prerequisites: None. Co-requisite: #7024. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb - A-Side (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064 Co-requisite: #7128 or #8128. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb - A-Side (#6192):** Provides an upgrade from 64Mb to 192Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064. Co-requisite: #7192 or #8192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb - A-Side (#6256):** Provides an upgrade from 64Mb to 256Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064. Co-requisite: #7256 or #8256. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 512Mb - A-Side (#6512):** Provides an upgrade from 64Mb to 512Mb of expanded storage on the A-Side. Order by MES only. Prerequisites: #5064. Co-requisite: #7512 or #8512. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb - A-Side (#6193):** Provides an upgrade from 128Mb to 192Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: #7192 or #8193. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb - A-Side (#6257):** Provides an upgrade from 128Mb to 256Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: #7256 or #8257. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 512Mb - A-Side (#6513):** Provides an upgrade from 128Mb to 512Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5128 or #6128. Co-requisite: #7512 or #8513. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 256Mb - A-Side (#6258):** Provides an upgrade from 192Mb to 256Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: #7256 or #8258. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 512Mb - A-Side (#6514):** Provides an upgrade from 192Mb to 512Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5192 or #6192 or #6193. Co-requisite: #7512 or #8514. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 256Mb to 512Mb - A-Side (#6515):** Provides an upgrade from 256Mb to 512Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5256 or #6256 or #6257 or #6258. Co-requisite: #7512 or #8515. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 512Mb to 1024Mb - A-Side (#6028):** Provides an upgrade from 512Mb to 1024Mb of expanded storage on the A Side. Order by MES only. Prerequisites: #5512 or #6512 or #6513 or #6514 or #6515. Co-requisite: #7024 or #8028. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Multiple High Performance Guests Support:** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests. The following features are required on the 3090 Model 600E:

- #6851 Multiple High Performance Guests Support on CP-1
- #6852 Multiple High Performance Guests Support on CP-2
- #6853 Multiple High Performance Guests Support on CP-0
- #7851 Multiple High Performance Guests Support on CP-3
- #7852 Multiple High Performance Guests Support on CP-4
- #7853 Multiple High Performance Guests Support on CP-5

Maximum: One each. Field Installation: Yes. Prerequisites: None

**Expanded Storage, 64Mb - B-Side (#7064):** Provides the first 64Mb increment of expanded storage on the B-side. Prerequisites: None. Co-requisite: #5064. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb - B-Side (#7128):** Provides 128Mb of expanded storage on the B-side. Cannot be ordered with #7064. Prerequisites: None. Co-requisite: #5128. Maximum: One. Field Installation: Yes.

**Expanded Storage, 192Mb - B-Side (#7192):** Provides 192Mb of expanded storage on the B-side. Cannot be ordered with #7064 or #7128. Prerequisites: None. Co-requisite: #5192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 256Mb - B-Side (#7256):** Provides 256Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128 or #7192. Prerequisites: None. Co-requisite: #5256. Maximum: One. Field Installation: Yes.

**Expanded Storage, 512Mb - B-Side (#7512):** Provides 512Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128, #7192 or #7256. Prerequisites: None. Co-requisite: #5512. Maximum: One. Field Installation: Yes.

**Expanded Storage, 1024Mb - B-Side (#7024):** Provides 1024Mb of expanded storage on the B-side. Cannot be ordered with #7064, #7128, #7192, #7256, or #7512. Prerequisites: None. Co-requisite: #5024. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 128Mb - B-Side (#8128):** Provides an upgrade from 64Mb to 128Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064 Co-requisite: #5128 or #6128. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 192Mb - B-Side (#8192):** Provides an upgrade from 64Mb to 192Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064. Co-requisite: #5192 or #6192. Maximum: One. Field Installation: Yes.

**Expanded Storage, 64Mb to 256Mb - B-Side (#8256):** Provides an upgrade from 64Mb to 256Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064. Co-requisite: #5256 or #6256. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 64Mb to 512Mb - B-Side (#8512):** Provides an upgrade from 64Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7064. Co-requisite: #5512 or #6512. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 128Mb to 192Mb - B-Side (#8193):** Provides an upgrade from 128Mb to 192Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7128 or #8128. Co-requisite: #5192 or #6193. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 256Mb - B-Side (#8257):** Provides an upgrade from 128Mb to 256Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7128 or #8128. Co-requisite: #5256 or #6257. Maximum: One. Field Installation: Yes.

**Expanded Storage, 128Mb to 512Mb - B-Side (#8513):** Provides an upgrade from 128Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7128 or #8128. Co-requisite: #5512 or #6513. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 256Mb - B-Side (#8258):** Provides an upgrade from 192Mb to 256Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7192 or #8192 or #8193. Co-requisite: #5256 or #6258. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 192Mb to 512Mb - B-Side (#8514):** Provides an upgrade from 192Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7192 or #8192 or #8193. Co-requisite: #5512 or #6514. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 256Mb to 512Mb - B-Side (#8515):** Provides an upgrade from 256Mb to 512Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7256 or #8256 or #8257 or #8258. Co-requisite: #5512 or #6515. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Expanded Storage, 512Mb to 1024Mb - B-Side (#8028):** Provides an upgrade from 512Mb to 1024Mb of expanded storage on the B-Side. Order by MES only. Prerequisites: #7512 or #8512 or #8513 or #8514 or #8515. Co-requisite: #6028. Maximum: One. Field Installation: Yes.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

The Expansion Frames are standard features on the Model 600E.

#### MODEL CONVERSIONS

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installation of the appropriate features on the additional Central Processors (CPs).

Model downgrades are not available.

#### ACCESSORIES

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator work station for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,708mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for Willow Green, #9162 for Garnet Rose, #9163 for Sunrise Yellow, #9164 for Classic Blue, #9165 for Charcoal Brown, #9166 for Pebble Gray, or #9167 for Pearl White.

#### SUPPLIES (NONE)

## 3090 PROCESSOR UNIT MODEL 120E

### PURPOSE

Provides arithmetic, logic and control function through a single integrated central processor with optional Vector Facilities and houses central storage, expanded storage, and channels for a 3090 Model 120E.

### MODEL 120E

**Model 120E 12E:** 33,554,432 (bytes) Central Storage, standard.

**Note:** At initial microcode load time, a minimum of 200K bytes of central storage is assigned for system usage and is unavailable for programs. Depending upon the number of UCWs required in the configuration, additional central storage may be required for the system area. Expansion of the system area occurs automatically as UCWs are added (up to one megabyte and a maximum number of devices supported equal to 4,096 minus the number of channels defined using IOCP).

**Prerequisites:** Each 3090 Model 120E Processor Unit requires:

1. One 3092 Model 3 Processor Controller
2. One 3097 Model 1 or 2 Power and Coolant Distribution Unit
3. One 3089 Model 3 Power Unit or other appropriate 400 Hz power source
4. One 3370 Model A02 Direct Access Storage Unit, (string switch feature #8150 not required), or equivalent
5. Two 3180 Model 140 Display Stations, or equivalent.
6. A 4800/2400 bps switched network modem supporting autoanswer feature and autocal unit.
7. Access to a path of a customer tape control unit operating in DC Interlock mode at a maximum 1.25Mb per second data rate for use by the 3092 Model 3 Processor Controller. If a tape drive with 10 1/2-inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 Model 4, 6, and 8, and the 3480 Models B11 and B22, or drives which are equivalent. See "Specify" for additional information.

Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

The system control program requires an appropriate operator station in addition to the 3180 system and service support display stations. The availability of an operator console is required to satisfy the minimum service configuration. Access to a tape drive is also required for installation and certain maintenance functions.

### HIGHLIGHTS

Contains 33,554,432 bytes of monolithic central storage, standard -- a single integrated central processor with a cycle time of 18.5 nanoseconds -- eight-byte data flow between each processor and storage -- 65,536 byte high-speed buffer -- optional vector facility for greatly increasing the processor's engineering and scientific processing capabilities -- integrated byte and block multiplexer channels -- extensive use of LSI logic circuitry -- has the ability to operate in S/370 mode or 370-XA mode -- 370-XA mode provides for addressing up to two gigabytes and provides for hardware controlled channel pathing to an I/O device -- distributed microcode control stores -- microcode assist for MVS -- extensive data checking -- S/370 mode provides for up to 32 channels per channel set (24 on 120E) -- VMS Start Interpretive Execution (SIE) -- Multiple High Performance Guests Support : Optional Multiple High Performance

Guests Support feature provides support for the VM/XA System Product (VM/XA SP) Release 1 Enhancement for Multiple Preferred Guests. If this VM enhancement is required, a feature must be installed on every Central Processor (CP).

**Standard Features:** 370-XA mode -- S/370 mode -- Universal Instruction Set -- S/370 Extended Facility -- extended addressing -- extended control mode -- PSW key handling -- conditional swapping -- set prefix -- store prefix -- signal processor -- store CPU address -- extended precision floating point -- high-speed multiply -- instruction retry -- time-of-day clock -- clock comparator -- CPU timer -- interval timer -- byte oriented operand feature -- key controlled storage protection -- page protection -- tracing -- processor storage error checking and correction -- storage configuration and control -- dynamic address translation -- program event recording -- store status -- program reset -- set system-mask suppression -- channel-set switching -- data streaming -- start I/O fast release -- clear I/O -- Virtual Machine Assist -- Preferred Machine Assist -- Sorting instructions.

**Expanded Storage:** Optional expanded storage allows reduction of I/O paging requirements under system program control. Available in 64Mb increments up to a maximum of 128Mb.

**Vector Facility:** The optional Vector Facility enhances performance in processing engineering/scientific jobs containing vectors. It adds high speed vector registers, a pipelined arithmetic and logical element, a pipelined multiplier, and a logical vector mask register to the base CP. The arithmetic elements produce a 32-bit floating point or binary result each cycle or a 64-bit floating point result each cycle except in a divide when the element produces a result every 16 cycles. Compound operations produce both a product and a sum (or difference) each cycle.

**Channels:** A total of 16 channels are standard. One additional group of eight block multiplexer channels is optional, providing for a total of up to 24 channels. Up to four channels may be initialized to operate as byte multiplexer channels. All block multiplexer channels are capable of operating in data streaming mode at a data rate of up to 4.5Mb per second. Each channel can physically attach up to eight control units. (See "Special Features" section.)

In S/370 mode, channels may be grouped into two logical channel sets, with up to 24 channels to a set, one set assignable to the central processor. In S/370 mode, channels may be given any valid logical designation.

In 370/XA mode the processor may initiate an operation with any I/O device and process any I/O interrupt, using any of the 24 channel paths. The 3090 Processor Complex can use up to a maximum of four different logical paths to a single device.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4- or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, or #9066 for pearl white.

- Tape Drive: Specify #9201 if the tape drive being used by the 3092 Model 3 Processor Controller is a 3420 Model 4, 6 or 8 or equivalent, or #9202 if the tape drive is a 3480 Model B11 or

**MACHINES**

B22 or equivalent. Only one type of tape drive may be specified. See M3092 product description for additional information.

- **Shipping Instructions:** (Use of this specify option will increase installation time. Use only as required.) Should the standard external dimensions of frame 3, 865mm wide by 1,795mm long (34 in. x 70.5 in.), the longest frame, require reduction in length, specify #9573. Specify code #9573 reduces frame 3 length to 1,590mm (62.5 in.) by removal of tailgate connector panel only. Should the external dimensions of the 3090 Processor Unit frames require reduction of 820mm wide by 1,525mm long (32 in. x 60 in.), specify #9571. Specify code #9571 reduces the external dimensions of frames 1, 2, 3, and 5 by removal of cover/hardware. Specify code #9573 is a prerequisite to #9571. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- **Weight Considerations:** (Use of this specify option will increase installation time. Use only where required.) Some elevators may have weight limitations of 1,136kg/2,500 lbs and may require partial depopulation of 3090 frames to satisfy this limitation. Specify #9581 to reduce frame 2 and frame 3 weights to less than 1,136kg/2,500 lbs. For additional information, see "IBM System/370 3090 Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.
- **Machine Nomenclature:** #2924 for English US, #2935 for Canadian French, #2931 for Spanish, #2930 for Japanese.

**Account Universal Lift Tool:** Select one:

1. First 3090 ordered in an establishment, specify #9330 when ordering a 3090 Processor Complex.
2. If 3090 ordered is second to be installed, no additional lift tool is required.
3. If 3090 is moved to a different location where one is not installed, a lift tool (#9330) is to be ordered on a no-charge MES.

**SPECIAL FEATURES**

**Vector Facility, First (#1545):** Provides the vector facility capability to the first central processor. Prerequisites: #7330. Maximum: One. Field Installation: Yes.

**Channel Group First Additional (#3848):** Provides the first additional group of eight block multiplexer channels. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb (#5064):** Provides the first 64Mb increment of expanded storage. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 128Mb (#5128):** Provides the first 128Mb increment of expanded storage. Cannot be ordered with #5064. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expanded Storage, 64Mb to 128Mb (#6128):** Provides an upgrade from 64Mb to 128Mb of expanded storage. Order by MES only.

Maximum: One. Field Installation: Yes. Prerequisites: #5064. Corequisite: None.

**Note:** Parts removed or replaced during field installation become the property of IBM and must be returned.

**Multiple High Performance Guests Support, (#6851):** Provides support for the VM/XA SP Release 1 Enhancement for Multiple Preferred Guests on the 3090 Model 120E. Maximum: One. Field Installation: Yes. Prerequisites: None.

**Expansion Frame (#7330):** Provides the housing for the 3090 Vector Facility (#1545). Maximum: One. Field Installation: Yes. Prerequisites: None. Corequisites: #1545.

**MODEL CONVERSIONS**

Model upgrades from 3090 Model 120E to 3090 Model 150E are field installable. The parts removed or replaced become the property of IBM and must be returned. Model downgrades are not recommended.

**Note:** The upgrade of a Model 10E to Model 150E will require an upgrade to the 3092 Processor Controller from a Model 3 to a Model 1. The 3092 Model 1 requires a second 3370 A02 Direct Access Storage (with string switch feature #8150), or equivalent. Specify #9017 if the 3370 A02 Direct Access Storage is not to be included. A string switch feature for the existing 3370 A02 Direct Access Storage, or equivalent, is a corequisite and must be ordered separately and be available on site at the time of installation.

Processor model field upgrades, in which the IBM 3090 Multiple High Performance Guests Support is installed, require the installation of the appropriate features on the additional Central Processors (CPs).

**ACCESSORIES**

The following is available on a purchase-only basis for shipment with the 3090 Processor Complex.

**Console Table, 3090 Processor Complex (#1590):** Provides an operator workstation for up to two operators and their display consoles. The table has a color accented front modesty panel, a shelf facing the back (rear), and a color accented back (rear) cover that hinges down 180 degrees. The purpose of the shelf is to provide a surface for a modem and autocal unit and therefore remove them from the top working surface since access to these is very infrequent. Cable management can be obtained by routing the display cables through the 50mm (2 in.) opening in the rear cover. The display cables and the modem cables exit through a cable open-hole in the shelf. The table measures 1,780mm (70 in.) long, 900mm (35 in.) deep, and 720mm (28 in.) high. Color: Specify #9161 for willow green, #9162 for garnet rose, #9163 for sunrise yellow, #9164 for classic blue, #9165 for charcoal brown, #9166 for pebble gray, or #9167 for pearl white.

**SUPPLIES (NONE)**

## 3092 PROCESSOR CONTROLLER

### PURPOSE

Provides the controlling mechanism for monitoring and supervising the 3090 Processor Complex. It also provides the adapters for the 3370 mdl A2 DAS units, the 3180 mdl 140 and 145 Display Stations, the 3287 mdl 1 or mdl 2 Printer, or the 4224 mdl 201 and mdl 202 Printer and the channels for attaching a tape control unit. It provides the interfaces for local and remote service and support for the Processor Complex.

### MODELS

**Model 001:** Supports the 3090 mdls 150, 150E, 180, 180E, 200, 200E and 300E Processor Complex.

**Model 002:** Supports the 3090 mdl 400, 400E and 600E Processor Complex.

**Model 003:** Supports the 3090 mdl 120E Processor Complex.

**Prerequisites:** Modem/Autocall: (Order separately.) Customer-provided switched network modem, supporting autoanswer, and autocall equipment. One modem with autocall equipment is required for the 3092 mdl 1. Two modems, each with autocall equipment, are required for the 3092 mdl 2. These must meet the following requirements:

**Modem:** A country approved or PTT mandatory modem with a CCITT V.24/V.28 communication interface at 1200, 2400, or 4800 bps, also compatible with modems installed at the remote support locations.

(Japan only > Modem: X.21bis interface at 2400/4800 bps. <)

**Autocall Equipment:** A country approved or PTT mandatory device with a CCITT V.25/ISO2110 autocall interface.

(Japan only > Autocall Equipment: X.21bis interface at 2400/4800 bps. <)

**Note:** The modem and autocall equipment are required unless prohibited by cross-border data transmission or otherwise limited by the supporting remote site. It is recognized that certain customers will elect not to provide these. These exception cases will be handled by the branch office when they occur.

**Tape Drive:** (Customer-provided.) Access to one path (3092 mdl 1) or two paths (3092 mdl 2) of a tape control unit operating in DC Interlock mode at a maximum 1.25MB/sec. data rate with attached tape drive for use by the 3092 Processor Controller. If a tape drive with 10.5 inch reels is being used, the tape density must be 6250 bpi. If a cartridge drive is being used, the cartridge density must be 38K bpi. Tape drives which are supported are the 3420 mdls 4, 6 and 8 and the 3480 mdls B11 and B22, or drives which are equivalent. Available for customer use when not being used for system maintenance functions. Needed for installation of a 3090 Processor Complex.

**Note:** Only one type of tape drive may be selected on a 3092 Processor Controller, e.g., either a tape drive supporting 10 1/2 inch reels or a tape drive supporting cartridges. The customer must specify which media is to be used.

**Display Consoles:** Two 3180 mdl 140 Display Stations, or equivalent, for use as the system display and the service support display on the 3092 mdl 1. Three 3180 mdl 140 Display Stations, or equivalent, two for use as the system displays and one as the service support display, are required for the 3092 mdl 2.

Three additional optional 3180 mdl 140 Display Stations are supported by the 3092 mdl 1 and mdl 2. One additional optional 3180 mdl 140 Display Station is supported by the 3092 mdl 3. These stations may be up to 1,500m (4,921 ft) from the 3092 Processor Controller.

Two 3370 mdl A2 DAS: (With string feature #8150) on the 3090 mdl 1 and mdl 2. See "Specify" for more information.

**Note:** The shielded cables for interconnecting the 3092 Processor Controller and the two 3370 mdl A2 DAS are 10.7m (35 ft) long and are provided with the 3090 Processor Complex.

**Optional Printer:** One customer-supplied 3287 mdl 1 or mdl 2 Printer, or 4224 mdl 201 or mdl 202 Printer is supported by the 3092 mdl 1. Up to two such customer-supplied printers are supported by the 3092 mdl 2. A 3287 Printer and a 4224 Printer may be intermixed on a 3092 mdl 2. The printers are optional and may be used for printing 3180 display screens.

**Operator Console:** Access to an operator console is required for use of OLTS Diagnostics during certain maintenance procedures.

### HIGHLIGHTS

The 3092 provides the machine to human communication for the entire 3090 Processor Complex. The 3092:

- Provides the control unit function for the system console, service console, system/service monitor console, and the program support console.
- Provides Duplexed Function.
- Supports the required 3180 mdl 140 Display Stations and the optional 3180 mdl 140 Display Stations.
- Supports the optional 3287 mdl 1 or mdl 2 Printers and the 4224 mdl 201 or mdl 202 Printers.
- Contains two processors (in normal operation, one is active and one is available for backup).
- Has an audible alarm providing notification of certain system conditions and associated set of contacts for customer use to install remote audible or visual alarm.
- Houses basic switches, lights, and indicators.
- Contains two diskette drives for maintenance data interchange.
- Monitors power levels and coolant flow.
- At initial microprogram load, controls microcode loading of distributed control stores.
- Assists the 3090 Processor Unit in error recovery.
- Battery operated time-of-day clock.
- Provides access to remote support locations via a prerequisite modem.
- Performs basic diagnostic and failure isolation at times concurrent with the above functions.

One 3092 Processor Controller is required with each 3090 Processor Complex.

**Publications:** GC20-0001.

### SPECIFY

Unless indicated otherwise, these specify codes are available only at time of manufacture.

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):

50 Hz  
200V #2807

60 Hz  
200V #2733

## MACHINES

220V	#2815	208V	#9903
380V	#2816	220V	#2800
400V	#2825	240V	#9915
415V	#2826		

- Color: #9065 for pebble gray, #9061 for garnet rose, #9063 for classic blue, #9060 for willow green, #9064 for charcoal brown, #9062 for sunrise yellow, or #9066 for pearl white.
- Shipping Instructions: (Use of this specify option will increase installation time. Use only where required.) Should the standard external dimensions of frame 7, 865mm wide by 1,615mm long (34 in. x 63.5 in.), require reduction to 815mm wide by 1,525mm long (32 in. x 60 in.), specify #9571. Specify #9571 reduces the external dimensions of frame 7 by removal covers/hardware. For additional information, see "IBM System/370 Installation Manual Physical Planning", GC22-7004, and/or your Installation Planning Representative.
- DAS: Two 3370 mdl A2 DAS with string feature #8150 must be ordered with the 3090 Processor Complex unless specified otherwise by the customer. Specify #9107 if 3370 DAS are not to be included.

A specify code is required on the 3370 mdl A2 DAS when they are being ordered for plant merging with the 3090 Processor Complex. Refer to M3370 pages for details.

- Consoles: Two 3180 mdl 140 Display Stations that will be dedicated for use as consoles must be ordered with a 3090 mdl 150, 150E, 180, 180E, 200, 200E or 300E Processor Complex and three mdl 140 Display Stations that will be dedicated for use as consoles with a 3090 mdl 400, 400E or 600E Processor Complex must be ordered, unless specified otherwise by the customer. Specify #9105 if 3180 Display Stations are not to be included.

The 3180 Display Stations will each be provided with a 3m (9.8 ft) power cable as standard.

- Modem and Autocall: The 3864 mdl 2 Modem(s) and Automatic Calling Unit feature(s) #5801 must be ordered with a 3090 Processor Complex unless specified otherwise by the

customer. Specify #9106 if the 3864 mdl 2 Modem(s) and Automatic Calling Unit feature(s) #5801 are not to be included.

### Machine Nomenclature:

English US #2924 Spanish #293  
Canadian French #2935 Japanese #293

- Remote 3180 mdl 140 Display Stations: The standard coaxial cables for interconnecting the 3092 Processor Controller and the two or three required 3180 mdl 140 Display Stations are each 10m (33 ft) long and are provided with the 3090 Processor Complex. Cables greater than 10m (33 ft) up to the maximum of 1,500m (4,921 ft) may be obtained for all except the mdl 140 Display Station used as the service support display. Refer to RPO 8P0891 in HONE for description and other information.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS

The 3092 mdl 3 Processor Controller is field upgradable to the 3092 mdl 1 Processor Controller. The 3092 mdl 1 Processor Controller is field upgradable to the 3092 mdl 2 Processor Controller. Parts removed or replaced during model upgrades become the property of IBM and must be returned. Model downgrades are not available.

**Note:** When the 3092 mdl 3 is upgraded to the 3092 mdl 1, a second 3370 A02 DAS (with string switch feature #8150), or equivalent, is required. Specify #9107 if this is not to be included. A string switch feature for the existing 3370 A02 Direct Access Storage, or equivalent, is a co-requisite and must be ordered separately and be available on site at the time of installation.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3097 POWER AND COOLANT DISTRIBUTION UNIT

### PURPOSE

Provides the distribution of power and coolant required by a 3090 Processor Complex.

### MODELS

**Model 1 001:** Supports 3090 Processor Complex with I/O Power Sequencing Control.

**Model 2 002:** Supports 3090 Processor Complex.

**Prerequisites:** Customer-supplied chilled water is required for the system. See "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074.

### HIGHLIGHTS

- Contains power distribution functions and heat exchanger, pumps, and controls necessary for cooling the liquid cooled portion of the 3090 Processor Complex.
- The 3097 model 1 contains I/O Power Sequence Control capability for associating up to 128 control units to the 3090 Processor Complex for power-on/power-off control.
- The 3097 model 2 does not contain I/O Power Sequence (IOPS) control capability. Guidelines for using the model 2 are discussed in the "3097 Model 2 Configuration Guidelines" section.
- One 3097 Power and Coolant Distribution Unit is required for each 3090 model 120E, 150, 150E, 180, 180E, 200, 200E, or 300E Processor Complex.
- Two 3097 Power and Coolant Distribution Units model 1 or 2 are required for each 3090 model 400, 400E, or 600E Processor Complex.

### 3097 Model 2 Configuration Guidelines

- The 3097 Model 2 is functionally equivalent to the 3097 Model 1 except that it does not contain I/O Power Sequencing (IOPS). IOPS may be required to perform either of the following functions:
  - IOPS gives the customer the ability to power on/off multiple control units by powering on/off the 3090 Processor Complex. Three IBM control units that do not have a customer accessible power on/off switch and use the power on/off capability of IOPS in the 3097 model 1 are:
    - ▲ 3505 Card Reader (3525 Card Punch)
    - ▲ 2501 Card Reader
    - ▲ 2821 Control Unit (for 1403 Printer and 2540 Card Reader Punch)
  - Customers who require customer accessible power on/off for these devices under control of the 3090 Processor Complex must use the 3097 model 1.
  - IOPS provides an electrical ground reference attachment for specified devices. The System/360, System/370, 4300 Processors:
    - ▲ "Input/Output Equipment Installation Manual - Physical Planning" (GC22-7064) states that certain devices require that the IOPS cable be attached for grounding purposes and that attachment is required for proper operation.
- Two control units which attach to the 3090 Processor Complex and use this function are the

3803 Tape Control Unit and the 3540 Diskette Input/Output Unit (which attaches via RPQ). The 3097 model 2 does not provide grounding positions for these control unit IOPS grounds. Therefore, provision has been made in the 3092 Processor Controller models 1, 2, and 3 to attach the ground lead of an IOPS cable to support the grounding requirement of up to six such control units. Customers with more than six such devices can satisfy this requirement by installing a 3097 model 1.

**Publications:** GC20-0001.

### SPECIFY

- Power (AC, 3-phase, 4-wire, 60 Hz or AC, 3-phase, 4 or 5-wire, 50 Hz):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Vector Facility: Specify #9983 if the 3097 is to be used with a 3090 model 120E, 150, 150E, 180, 180E, 200, 200E or 300E Processor having the Vector Facility, First (#1545). Specify #9983, if the 3097 is to be used with the A-side of a model 400, 400E, or 600E Processor having the Vector Facility, First, A-side (#1545). Specify #9983 if the 3097 is to be used with the B-side of a model 400, 400E, or 600E Processor having the Vector Facility, First, B-side (#1546).
- Multiple High Performance Guests Support (MHPGS): Specify #9850 if the 3097 is to be used with a 3090 model 120E, 150E, 180E, 200E, or 300E or either side of a 3090 model 400E or 600E with the MHPGS hardware feature #6851.
- Multiprocessing: Specify #9984 if the 3097 is to be used with the A-side of a 3090 model 400, 400E or 600E Processor Complex. Specify #9985 if the 3097 is to be used with the B-side of a model 400, 400E, or 600E Processor Complex.
- 3090 model 180E, 200E, 300E, 400E, 600E Attach: Specify #9352 if the 3097 is to be attached to a 3090 Processor Complex model 180E, 200E, 300E, or either side of a 3090 Processor Complex model 400E or 600E. Specify #9351 if the 3097 is to be attached to a 3090 Processor Complex model 150, 180, 200, 120E, 150E or either side of a 3090 Processor Complex model 400.
- Power: 400 Hz power to a 3097 may be one (for 3090 models 120E, 150, 150E, 180, 180E) or two (for 3090 models 180, 180E, 200, 200E, 300E, or for A-side and B-side of models 400, 400E, 600E), 3089 model 3 Power Units or one (for models 120E, 150, 150E, 180, 180E) or two (for models 180, 180E, 200, 200E, 300E, or for A-side and B-side of models 400, 400E, 600E) customer-provided sources or a combination of either when two are required. To describe the appropriate mix for a 3097 attached to a 3090 Processor Unit, specify the following:

Number	Number
3089s	Customer-Provided

Mdls 180,180E (w/ Vector and 192Mb of Expanded Store or greater) or 200, 200E, 300E, or the A-side of a 400, 400E, or 600E #9491

0

2

## MACHINES

#9492	1	1
#9493	2	0
Mdls 120E, 150, 150E, 180, or 180E (w/o Vector or w/less than 192Mb of Expanded storage)		
#9488	0	1
#9489	1	0
The B-side of a model 400, 400E, or 600E		
#9496	0	2
#9497	1	1
#9498	2	0

Refer to the "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074 for specific model 180 and 180E configuration power requirements.

- Shipping Instructions: (Use of this specify option will increase installation time. Use only when required.) Should the standard external dimensions of frame 4 (14) or 6/8 (16/18), 815mm wide by 1,600mm long (32 in. x 63 in.), require reduction in length, specify #9571 (for frame 4 or 6/8) or #9671 (for frame 14 or 16/18). Specify code #9571 (#9671) reduces the length of frames 4 (14) and 6/8 (16/18) to 1,525mm (60 in.), by removal of covers/hardware. For additional information, see the "IBM System/370 3090 Processor Complex Installation Manual - Physical Planning", GC22-7074, and/or your Installation Planning Representative.

**Note:** Specify code #9571 (#9671) applies only to frame 4(14) on a 3097 model 2.

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, #9066 for pearl white.
- Machine Nomenclature: #2924 for US English, #2931 for Spanish, #2935 for French Canadian, #2930 for Japanese.

## SPECIAL FEATURES

**I/O Power Sequence Control (#4650):** (Available only on model 1.) The 3097 Power and Coolant Distribution Unit has a standard capability of associating 64 control units to a 3090 Processor Complex. When requirements exceed these 64 power control relays, #4650 provides for power-on/power-off control for the 65th through 128th control unit. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS

Model upgrade from a 3097 model 2 to a 3097 model 1 is field installable. Model downgrade from 3097 model 1 to 3097 model 2 is not available.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3115 PROCESSING UNIT

(NO LONGER AVAILABLE)

The 3115 is No Longer Available -- MES orders for model conversions, features, released RPQs and accessories are not affected. No new RPQs will be accepted.

### PURPOSE

Provides main and control storage, plus arithmetic and logic circuits for a S/370 mdl 115 including a direct disk attachment.

### MODELS

The 3115-0 and 3115-2 Processing Units are available in the following model groups:

Models

				Processor Storage Size
3115-0		3115-2		
F	F00	F2	F02	65,536 bytes
FE	FE0	FE2	FE2	98,304 bytes
G	G00	G2	G02	131,072 bytes
GE	GE0	GE2	GE2	163,840 bytes
GF	GF0	GF2	GF2	196,608 bytes
		H2	H02	262,144 bytes
		HG2	HG2	393,216 bytes*

For differences between the two mdl series, refer to the "Systems" pages.

\* Note: If 3411 Magnetic Tape and Control is attached, see Magnetic Tape Adapter special feature paragraph for RPQ requirement.

### HIGHLIGHTS

Depending upon the mdl, 65,536 to 393,216 bytes of processor storage are available. The basic main memory cycle time is 480 nanoseconds for 2 bytes. Sixteen general, sixteen control and four floating point registers are provided. The system design provides distributed microcoded processors within the Central Processing Unit for the independent handling of programs, input/output processing and diagnostic/maintenance. Direct attachment of the 3340 DASD Subsystem or the 3340/3344 DAS Subsystem (3115-2 only) is provided. Depending on the mdl and feature up to eight drives can be attached. In a 3340 DASD Subsystem, via the string switch capability (#9315), the 3340 mdl A2 can be shared with another S/370, except 3115-0 and 3125-0. For details and restrictions refer to the 'Direct Disk Attachment' paragraph.

The 2311 Mdl 1/3340 - Series and the 2314/3340 - Series Compatibility features are available as options. They are mutually exclusive. Emulation is under DOS/VS only. 2311 mdl 1 emulation under DOS/VS requires SYRES on 3340.

Capability to attach the 3803/3420 or 3411/3410 magnetic tape subsystem mdl 1, 2 or 3 via the optional Magnetic Tape Adapter.

Capability to natively attach one of the following card I/O: 2560 mdl A1 or A2, or the 5425 mdl A1 or A2 (96-column card) via the optional integrated Card I/O Attachment features.

Capability to attach a wide variety of I/O devices via the optional Byte Multiplexer Channel. Note: The Integrated Card I/O Attachment and the Byte Multiplexer Channel cannot be installed on the same system unless RPQs 7B0158 and 7B0159 are installed.

Capability to natively attach the 5213 Printer mdl 1 (85 cps) is provided with the optional integrated console printer attachment on the

3115. This console printer provides hardcopy output of operator messages presented on the Display Operator Console (DOC).

The optional 1052 Compatibility feature is available to emulate the 1052 Printer keyboard in the S/370 mdl 115. 1052 Compatibility (#8005) in combination with the 5213 Printer mdl 1 allows the mdl 115 to be used as a remote workstation with HASP-RMT/360. Note: The 1052 compatibility mode is not supported under DOS/VS. With DOS/VS, the 5213 mdl 1 will act as a slave unit to the DOC.

Capability to attach up to 5 synchronous lines, or up to 4 synchronous and up to 8 asynchronous lines is provided by the optional Integrated Communications Adapter with appropriate features.

Capability to attach the 5203 Printer mdl 3 or 3203 Printer mdl 1 or 2 is provided with optional Integrated Printer Attachment features.

The optional S/360 Mdl 20 and 1401/1440/1460 Compatibility features are available to allow execution of the instructions of those programs.

The Display Operator Console (DOC) is an integral part of the S/370 mdl 115 operator-machine communications. Data can be entered into main storage or into internal registers via the keyboard. Contents of storage or internal registers of the S/370 mdl 115 can be shown on the video screen with 16 lines of 56 characters/line. A portion of the screen is reserved to display machine status. The Service Processor (SVP) continuously monitors system operation and logs errors on the magnetic IBM Diskette device. The SVP initiates recovery on detection of error conditions and provides control for the display, keyboard, console file and optional console printer.

The standard console file is the basic microprogram loading device for the system. It contains a small file device, which reads and writes on a removable magnetic IBM Diskette. The diskettes will contain the required microcode for the basic system, the optional features ordered for system, and CE diagnostics.

The CE logout of machine and I/O related control checks and errors are recorded on the diskette for CE diagnosis, to enhance the reliability, availability, and serviceability of the S/370 mdl 115.

Dynamic Address Translation (DAT) is a standard facility on the mdl 115. Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the mdl 115.

Standard features include S/370 commercial instruction set, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording (PER), Monitor Call, interval timer, time of day clock, CPU-Timer and Clock Comparator, store and fetch protect, byte oriented operand feature error checking and correction of single bit errors on main storage, and Audible Alarm.

**Control Storage:** On the 3115-0, reloadable control storage for Service Processor (SVP), and Direct Disk Attachment and the basic part of the Machine Instruction Processor (MIP) is provided as standard on the 3115 Processor Unit. In addition, reloadable control storage is provided with the optional Card I/O Attachment, Printer Attachment, Integrated Communications Adapter (ICA), Byte Multiplexer Channel. The MIP contains as standard, 20K words of 22 bits of control storage and may be expanded either to 24K words (4K Control Storage Extension, #4101) or to 28K words (8K Control Storage Extension, #4104). #4101 and #4104 are mutually exclusive. See Chart A below for possible feature combinations and control storage requirements.

**Note:** Customers who elect to purchase the 4K Control Storage Extension and later upgrade to the 8K Control Storage Extension should consider the purchase of the 8K Control Storage Extension initially because this field upgrade requires replacement of the 4K Control Storage Extension and installation of the 8K Control Storage Extension. This is, however, not recommended for customers considering to eventually convert to a 3115-2.

On the 3115-2, the Instruction Processing Unit (IPU) contains as standard, 12K words of control storage. Certain feature combinations can use up to two additional 4K words increments totaling 20K words of control storage. See Chart B for details.

Chart A

Listed below are the valid feature combinations and their respective requirements for additional control storage on the 3115-0.

Optional Features -- Mdl 3115-0	Basic Control Storage	4K Cntrl Stor Extension -- (#4101) Req'd
Floating Point (#3900)**	X X	X X X X
Floating Point Including Extended Precision (#3910)**	X X	X X X X
1401/1440/1460 Cmpt (#4457)	X	X X X X X
S/360 Mdl 20 Cmpt (#7520)	X	X X X X
2311-1/3340 Series Cmpt (#8060)***		X X X X X
2314/3340 Series Cmpt (#8070)***		X X X X X

Optional Features -- Mdl 3115-0	8K Cntrl Stor Extension -- (#4104) Req'd
Floating Point (#3900)**	XX XX
Floating Point Including Extended Precision (#3910)**	XX X X
1401/1440/1460 Cmpt (#4457)	XX XX X X
S/360 Mdl 20 Cmpt (#7520)	XX XX XX
2311-1/3340 Series Cmpt (#8060)***	X X X X X
2314/3340 Series Cmpt (#8070)***	X X X X X

\* #4101 and #4104 are mutually exclusive.  
 \*\* #3900 and #3910 are mutually exclusive.  
 \*\*\* #8060 and #8070 are mutually exclusive. In addition, #8060 and #8070 are mutually exclusive with specify #9190.

Chart B

Listed below are the valid feature combinations and their respective requirements for additional control storage on the 3115-2.

Optional Features -Mdl 3115-2	Basic Control Storage	First Cntrl Stor Increment (#4101) Required
Floating Point Including Extended Precision (#3910)	X X	X X X X
1401/1440/1460 Com-patibility (#4457) **	X	X X X
S/360 mdl 20 Com-patibility (#7520) **	X	X X X X
2311-1/3340 Series Com-patibility (#8060) *		X X X
2314/3340 Series Com-patibility (#8070) *		X X X

Optional Features -Mdl 3115-2	Second Cntrl Stor. Incre-ment (#4101) and (#4102) Required**
Floating Point Including Extended Precision (#3910)	X X XX
1401/1440/1460 Com-patibility (#4457) **	X X XX
S/360 mdl 20 Com-patibility (#7520) **	X X
2311-1/3340 Series Com-patibility (#8060) *	X X
2314/3340 Series Com-patibility (#8070) *	X X X

\* #8060 and #8070 are mutually exclusive. In addition, #8060 and #8070 are mutually exclusive with Specify feature #9190 or 3344 Attachment specify feature #9317.

\*\* 1401/1440/1460 Compatibility (#4457) and S/360 Mdl 20 Compatibility (#7250) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed on the 3115-2). Note: RPQ SU0002 cannot be installed if the 2311 mdl 1/3340-Series Compatibility (#8060) or 2314/3340-Series Compatibility (#8070) is installed. Cannot be installed with 3344 Attachment (#9317). Specify feature #9315 is mutually exclusive with #4102 and/or #4460.

**Input/Output Attachment - Native:** The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices. They are designed to interact with their respective I/O devices and should be installed or removed with them since the system is inoperative with only the attachment/adaptor installed.

**Direct Disk Attachment (standard):** This attachment is provided to attach the 3340 mdl A2 dual drive unit and control directly to the S/370 mdl 115. This is addressed as channel 1. This attachment provides block multiplexing.

**3340 DASD Subsystem:** On the 3115-0 one 3340 mdl A2 and one 3340 mdl B1/B2 can be attached to provide up to four spindles. On the 3115 mdl 2 (w/o 3344 Attachment #9317) one 3340 mdl A2 and up to three 3340 mdl B1/B2s can be attached to provide up to eight spindles.

**3340/3344 DAS Subsystem:** On the 3115-2 with 3344 Attachment #9317 installed. One 3340 mdl A2 and any combination of up to three 3340 mdl B1/B2s and 3344 mdl B2/B2Fs can be attached. With the String Switch (#8150) installed, the 3340 mdl A2 may be shared with another S/370 except 3115-0 and 3125-0. Specify features, String Switch Capability (#9315) and 3344 Attachment (#9317) are mutually exclusive. String Switch capability is not supported on a 3344 configuration. 4K DASD Control Storage Extension is required when either #9315 or #9317 is installed. Specify Fixed Head Attachment (#9190) if Fixed Head Feature on 3340 is installed on 3340 Series drives. See Chart A for control storage requirements.

**Magnetic Tape Adapter (optional)** -- this feature attaches one of the following tape control units and is addressed as channel 2:

3411 Magnetic Tape Unit and Control mdl 1 -- tape control (20 KB) housing one tape drive. Up to three 3410 Magnetic Tape Unit mdl 1s may be attached to the 3411 mdl 1.

3411 Magnetic Tape Unit and Control mdl 2 -- tape control (40 KB) housing one tape drive. Up to five 3410 Magnetic Tape Unit mdl 2s may be attached to the 3411 mdl 2.

3411 Magnetic Tape Unit and Control mdl 3 -- tape control (80 KB) housing one tape drive. Up to five 3410 Magnetic Tape Unit mdl 3s may be attached to the 3411 mdl 3.

3803 Tape Control mdl 3 -- up to eight 3420 mdl 3 (120 KB) or mdl 5 (200 KB) may be attached to the 3803.

**Integrated Card I/O Attachments (optional):** These features provide native attachment of one of the following:

2560 Multifunction Card Machine mdl A1 or A2  
5425 Multifunction Card Unit mdl A1 or A2.

The Integrated Card I/O Attachment uses channel 0. Device address X'00D' is reserved for the 2560 or 5425.

The Integrated Card I/O Attachments and the optional Byte Multiplexer Channel cannot be installed together on the same system unless RPQs 7B0158 and 7B0159 are installed.

**Integrated Printer Attachment (optional):** Attachment features for the 5203 Printer mdl 3 or the 3203 Printer mdl 1 or 2 are provided. One printer unit may be natively attached. The printer attachment is addressed as channel 0 and the device address is X'00E'. The Universal Character Set (UCS) control is standard on the 3203. On

the 5203, UCS control may be specified on Integrated 5203 Mdl 3 Attachment (#4690).

**Integrated Console Printer Attachment (optional):** Attaches the 5213 Printer mdl 1 to the 3115 to provide hard copy of operator messages presented on the standard Display Operator Console. It uses address X'01F' (same as the Display Operator Console) on Channel 0. When the 1052 Compatibility feature is installed, the 5213 Printer mdl 1 is required.

**Integrated Communications Adapter (ICA) (optional):** Provides the basic control storage and common circuits for direct attachment of up to five synchronous (BSC) communications lines OR up to eight asynchronous (Start/Stop) lines. See individual ICA features for limitations. The Integrated Communications Adapter Extension (ICAE) provides the capability to attach up to four BSC AND up to eight Start/Stop lines. IBM line adapters are provided within the mdl 115.

## Input/Output Channel

**Byte Multiplexer Channel (Optional):** Provides for the attachment of a wide variety of low speed devices. The single channel available on the S/370 mdl 115 is functionally equivalent to the Byte Multiplexer Channel on the S/360 mdls 22, 25, 30 and 40 and provides for a maximum of up to eight control unit positions. 32 sub-channels are provided as standard and are divided into 8 shared and 24 unshared subchannels.

The Integrated Card I/O Attachments and the Byte Multiplexer Channel cannot be installed together on the same system unless RPQs 7B0158 and 7B0159 are installed.

**Console Function:** System control functions are provided by the standard integrated Display Operator Console. It has the switches, keyboard, and lights necessary to operate and control the system. It uses address X'01F' on channel 0. The 5213 mdl 1 console printer (85 cps) may be attached optionally.

**Publications:** GC20-0001

## SPECIFY

### ● Power (AC, 3-phase):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

### ● Line Cord for Japan, 50 & 60 Hz: #2747.

### ● Color: #9041 for Red, #9042 for Yellow, #9043 for Blue, #9045 for Gray, #9046 for White.

### ● Fixed Head Attachment (#9190)\* If Fixed Head Feature is installed on 3340 Series drives. Note: The Fixed Head Attachment (#9190) cannot be installed with 2311-1/3340 Series Compatibility (#8060) or 2314/3340 Series Compatibility (#8070).

### ● String Switch Capability (#9315)\* If String Switch (#8150) is installed on the 3340 mdl A2. Note: 4K DASD Control Storage Extension (#4210) is prerequisite. Cannot be installed with #4102 or #4460 or 3344 Attachment #9317. When String Switch is installed, an Emergency Power-Off connection between the sharing systems is mandatory. RPQ DC3621 (two system connection) or DC3622 (multiple system connection) must be ordered.

The 3115-2 uses fixed addresses 160 to 167 for its attached disk drives. In the case of string switch, to avoid confusion in Job Control and Operation, the same addresses should be assigned to shared drives on the other system. In the case of the 3135, 3135-3, 3138 IFA, this requires specify code #9821 on the 3135 providing addresses 160 through 167 to comply with

the fixed addresses of the 3115. If intermixing 3330s and 3340s on the 3135 (#9315), no string switching with the 3115-2 is possible.

**Note:** The string switch of the DASD hardware function can be operated with the present DOS/VS standard DASD support. DOS/VS does not support the device reserve/release channel commands for program controlled sharing of attached DASD units. Therefore, it is the user's responsibility by appropriate organization and programming procedures to resolve conflicting references to shared files and insure data integrity. One method for controlling potential conflicts involves the use of operator commands DVC UP/DVC DN. For additional information, consult "DOS/VS System Management Guide", GC33-5371.

- On the 3115-2, specify 3344 Attachment (#9317)\* when 3344 mdl B2/B2F are installed. 4K DASF Control Storage Extension is required. Cannot be installed with any of the following: String Switch Capability (#9315), 231X/3340 Compatibility (#8060/ #8070), S/360 Mdl 20 Compatibility (#7520), 1401/1440/1460 Compatibility (#4457), or 1403/3203 Carriage Control Feature (#4460).
- Minimum Configuration: See "Minimum Configuration" in "Systems" for minimum I/O units required on a S/370 mdl 115.
- Video Display/Keyboard Console Language Combination is identical to mdl 125. See chart at end of M3125 pages for "Specify Code".
- 1255, 1259 or 1419 Attachment: Specify #9336 (3115-0 only). External Signal (#3898) is required to attach a 1255, 1259 or 1419.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Planning for Mdl Conversions:** When a customer requires feature changes and/or memory upgrades in addition to a mdl upgrade, consolidating the several changes into a single MES is not recommended. In these cases a planning session between sales, CE and the customer is required to develop the proper sequence of MES ordering.

### SPECIAL FEATURES

**Expansion Base (#3860):** (3115-2) Provides additional gate and blowers, etc., and is required if RPQs 7B0158 and 7B0159 are not installed:

for all mdls H2 and HG2  
 for mdls F2, FE2, GE2 or GF2 if a Line Adapter Base 2 (#4792) or Line Adapter Base 3 (#4793) is required.

Maximum: One. Field Installation: Yes.

**External Signals (#3898):** Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. Maximum: One per 3115. Cable Order: Required. Field Installation: Yes. Prerequisites: External devices must meet the interface specifications outlined in S/360 Direct Control Feature - OEM I, GA22-6845.

**Floating Point (#3900):** (3115-0) Adds 44 floating point arithmetic instructions -- these instructions with the standard set make up the Scientific Instruction Set. Field Installation: Yes. Limitations: Cannot be installed with Floating Point Including Extended Precision (#3910).

**Floating Point Including Extended Precision (#3910):** Adds 51 floating point arithmetic instructions. Provides for floating point operation including extended precision to 28 hexadecimal digits. Field Installation: Yes. Limitations: Cannot be installed with Floating Point (#3900). Prerequisites: See Charts A/B above for control storage requirements.

**4K Control Storage Extension (#4101):** Adds 4,096 words (22 bits wide) of control storage to the Machine Instruction Processor (3115-0) or Instruction Processing Unit (3115-2). Required for certain feature combinations -- See Charts A/B above for details. Limitations: Cannot be installed with 8K Control Storage Extension (#4104). Field Installation: Yes. See "Note" following "Field Installation" for 8K Control Storage Extension (#4104) below.

**4K Control Storage Increment - 2nd (#4102):** (3115-2) Expands the IPU control storage by 4,096 words (22 bits wide). Required for certain feature combinations, see Chart B. Limitations: Cannot be installed with #4210 or specify feature #9315. Maximum: One. Field Installation: Yes. Prerequisites: #4101.

**8K Control Storage Extension (#4104):** (3115-0) Adds 8,192 words (22 bits wide) of control storage to the Machine Instruction Processor. Required for certain feature combinations, see Chart A above for details. Limitations: Cannot be installed with 4K Control Storage Extension (#4101). Field Installation: Yes. Note: Customers who may elect to purchase the 4K Control Storage Extension and later upgrade to the 8K Control Storage Extension should consider the purchase of the 8K Control Storage Extension initially because this field upgrade requires replacement of the 4K Control Storage Extension and installation of the 8K Control Storage Extension.

**4K DASF Control Storage Extension (#4210):** (3115-2) Adds 4,096 words (22 bits wide) to the DDA control storage. Required for string switch capability specify feature (#9315) or 3344 Attachment, specify feature (#9317). Limitations: Cannot be installed with #4102 or #4460. Maximum: One. Field Installation: Yes.

**1401/1440/1460 Compatibility (#4457):** Microprogram controlled feature which, in combination with an emulator program under DOS/VS, permits the system to execute 1401/1440/1460 instructions. Field Installation: Yes. Prerequisites: See Charts A/B above for control storage requirements. Note: On the 3115-2, #4457 and S/370 Mdl 20 Compatibility (#7250) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed). Limitations: Cannot be installed with 3344 Attachment (#9317).

**1403/3203 Carriage Control Feature (#4460):** Allows the 3203 Printer with its tapeless carriage control to emulate the function of a tape controlled carriage and thus run programs written for a 1403 Printer. Limitations: The 5203 Printer is not supported by this feature. Cannot be installed with string switch capability (#9315) or 3344 Attachment, specify feature (#9317). Field Installation: Yes. Prerequisites: 3203 Printer. Note: This feature is not required with DOS/VS Release 31 and subsequent releases.

**Integrated 3203 Printer Attachment (#4650):** Control for attaching the 3203 Printer mdl 1 or 2. The Universal Character Set is standard. Specify: #9770 for mdl 1 or #9771 for mdl 2. Limitations: Cannot be installed with Integrated 5203 Attachment (#4690). Maximum: One. Field Installation: Yes. Prerequisites: #4653.

**Integrated 3203/5203 Printer Prerequisite (#4653):** Provides a common control base for attaching either the 3203 or 5203 Printer. Required as a feature for installation of the Integrated 3203 Printer Attachment (#4650), or Integrated 5203 Printer Attachment (#4690). Maximum: One. Field Installation: Yes.

**Integrated 2560 Attachment (#4670):** Control for attaching the 2560 Multi-function Card Machine mdl A1 or A2. Specify: #9800\* for mdl A1, or #9801\* for mdl A2. Limitations: Cannot be installed with Integrated 5425 Attachment (#4695) or Basic Byte Multiplexer Channel (#5248) -- installation of RPQs 7B0158 and 7B0159 are required to install #4670 with Basic Byte Multiplexer Channel (#5248). Maximum: One. Field Installation: Yes. Prerequisites: #9727 is required on the 2560 MFCM, see "Specify" in M2560 pages.

**2560 Card Print Control (#4674):** Provides control for Card Print capability on the 2560 Multi-function Card Machine mdl A1. Specify: #9797\* for first two print lines, #9798S for second two, #9799\* for third two, when corresponding Card Print features (#1575, #1576, #1577) are installed on the 2560 mdl A1. Field Installation: Yes. Prerequisites: #4670 on the 3115.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

## 2560 Print Languages:

English US	#2956*
Japanese	#2968*
Katakana	#2973*
Spanish (except Spain)	#2961*

**Magnetic Tape Adapter (#4675):** Provides control for attachment of one 3411 Magnetic Tape Unit and Control mdl 1, 2 or 3 or one 3803 Tape Control mdl 3. See M3420 and 3803 or 3411 and 3410 pages for additional ordering instructions. The Magnetic Tape Adapter is addressed as Channel 2. Maximum: One. Specify: #9807 for attachment of 3803 mdl 3. See "Highlights" for additional information. Field Installation: Yes. Limitations: A 3803 and 3411 cannot coexist on the Magnetic Tape Adapter. Prerequisites: #7361 on the 3411, except for 3115 mdl HG2. When attached to 3115 mdl HG2, RPQ 870061 is required on the 3411.

**Integrated 5203 Mdl 3 Printer Attachment (#4690):** Control for attaching the 5203 Printer mdl 3. Limitations: Cannot be installed with Integrated 3203 Printer Attachment (#4650). Maximum: One. Field Installation: Yes. Prerequisites: #4653 and #9223 on the 5203 mdl 3. Specify: #9195\* for 5203 with 120 print positions, or #9152\* for 5203 with 132 print positions. Specify Universal Character Set Control (#9848)\* when Universal Character Set Attachment (#8639) is specified on the 5203 mdl 3.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Integrated 5213 Printer Mdl 1 Attachment (#4692):** Attaches the 5213 Printer mdl 1. Includes a special cable to support the printer. Maximum: One. Field Installation: Yes.

**Integrated 5425 Attachment (#4695):** Control for attaching the 5425 Multi-function Card Unit mdl A1 or A2. Specify: #9183\* for mdl A1, or #9184 for mdl A2. Limitations: Cannot be installed with Integrated 2560 Attachment (#4670) or Basic Byte Multiplexer Channel (#5248) -- installation of RPQs 7B0158 and 7B0159 are required to install #4695 with Basic Byte Multiplexer Channel (#5248). Maximum: One. Field Installation: Yes. Prerequisites: If the 5425 is attached to 3115 either a 3203 or 5203 Printer is required to provide the necessary power. If however, a separate power supply for the 5425 is desired, IBM will provide it on an RPQ basis.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Basic Byte Multiplexer Channel (#5248):** To attach low speed byte multiplex devices, see "Byte Multiplexer Channel" under "Input/Output Channel". Feature includes control storage necessary for IOP operation. Limitations: The basic Byte Multiplexer Channel (#5248) and the Integrated Card I/O Attachments (#4670 or #4695) cannot be installed together on the same system unless RPQs 7B0158 and 7B0159 are installed. On the 3115-2, only the Extended Byte Multiplexer Channel (#5249 with #5248 as a prerequisite) with a data rate up to 25KB is available. Specify: On the 3115-0, specify #9336 when attaching a 1255, 1259 or 1419. Maximum: One. Field Installation: Yes.

**Extended Byte Multiplexer Channel (#5249):** (3115-2) Provides the additional circuitry to enable the Basic Byte Multiplexer Channel to operate at an improved byte data rate up to 25KB. Maximum: One. Field Installation: Yes. Prerequisites: #5248.

**S/360 Mdl 20 Compatibility (#7520):** Microprogram controlled feature which, in combination with special software, permits the system to execute S/360 mdl 20 instructions. Field Installation: Yes.

Note: On the 3115-2, #7520 and 1401/1440/1460 Compatibility (#4457) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed). Limitations: Cannot be installed with 3344 Attachment (#9317).

**1052 Compatibility (#8005):** Operates on the 5213 Printer mdl 1 and standard keyboard as an operator console in S/360 1052 mode only. In this emulation mode of operation the Video/Display acts as a slave unit to the printer. The 1052 Compatibility feature in combination with the 5213 Printer mdl 1 allows running of HASP/360 RMT 360 (stand-alone program) on the S/370 mdl 115. Note: The 1052 compatibility mode is not supported under DOS/VS. With DOS/VS the 5213 mdl 1 acts as a slave unit to the DOC. Field Installation: Yes. Prerequisites: #4692 and the 5213 Printer mdl 1.

**2311 Mdl 1/3340 - Series Compatibility (#8060):** Permits the emulation of 2311 mdl 1 files on the 3340 disk storage. The user program may access both the emulated 2311 mdl 1 data as well as the native data set. This provides a "mixed mode" operating environment. Limitations: #8060 cannot be installed with #8070, #9190 or #9317. Field Installation: Yes. Prerequisites: See Charts A/B above for control storage requirements. Note: When running DOS Rel. 21 through 26, 1052 Compatibility (#8005), the 5213 mdl 1 console printer and, if a 3203 Printer is attached, the 1403/3203 Carriage Control Feature (#4460) are prerequisites. The 5203 Printer is not supported by #4460. Emulation under DOS/VS requires SYRES on the 3340 DASD.

**2314/3340 - Series Compatibility (#8070):** Permits the emulation of 2314 files on the 3340 disk storage. The user program may access both the emulated 2314 data set as well as the native data set. This provides a "mixed mode" operating environment. Limitations: #8070 cannot be installed with #8060, #9190 or #9317. Field Installation: Yes. Prerequisites: See Charts A/B above for control storage requirements. Note: When running DOS Rel. 21 through 26, 1052 Compatibility (#8005), the 5213 mdl 1 console printer and if a 3203 Printer is attached, the 1403/3203 Carriage Control Feature (#4460) are prerequisites. The 5203 Printer is not supported by #4460. Emulation under DOS/VS requires SYRES on the 3340 DASD.

## Communication Features

**Integrated Communications Adapter (ICA) (#4640):** Provides the basic control storage and common circuits for direct attachment of up to five synchronous (BSC) communication lines or up to eight asynchronous (Start/Stop) communication lines depending upon line speed. All combinations of BSC and Start/Stop lines require the Integrated Communications Adapter Extension (#4641). Additional features are required to create appropriate line interfaces for the individual lines. Figures 1A and 1B schematically represent the feature build-up. Figure 1A shows the feature build-up for asynchronous lines or for combinations of asynchronous and synchronous lines. Figure 1B shows the feature build-up when only synchronous lines are required. The ICA provides as a standard:

- Autopoll - Start/Stop and BSC
- Multipoint central station functions - Start/Stop and BSC
- Multipoint tributary station functions - BSC only
- EBCDIC transparent mode - BSC only
- EBCDIC or ASCII code - BSC only

Refer to Figures 2A and 2B for attachable terminals and for configuration requirements prior to ordering features below. The normal procedure requires completion of ICA Specification Form Z120-2499 with each mdl 115 containing feature #4640. Any subsequent MES orders affecting #4640 or its sub-features should follow this procedure.

Note: An APL Configurator is available through the HONE system to assist in configuring the ICA (or refer to "ICA Configurator Manual", GA33-1513).

**Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communications facilities and services. Communications Facilities: See M2700 pages for communications facility requirements with this feature. Maximum: One. Field Installation: Yes.

**Integrated Communications Adapter Extension (ICAE) (#4641):** This feature is required for all combinations of BSC and Start/Stop lines. Extends the communications capability to up to four BSC and up to eight Start/Stop lines depending upon line speed. Maximum: One. Field Installation: Yes. Prerequisites: #4640.

**Asynchronous Line Group (ALG) (#1201):** Permits attachment of up to four Medium Speed Asynchronous Lines (AL) (#1231) or up to four Low Speed Asynchronous Lines Pairs (ALP) (#1241) or up to four Telegraph Line Pairs (TLP) (#7881). The lines within the ALG positions A1 through A4, must be installed in ascending order. Specify: One line control specify code from Figure 2A. Limitations: All lines in the ALG must have the same line speed and control. Different terminals can be attached, provided they use the same speed and line control. See Figure 2A. ALG (#1201) and SLHS (#7121) are mutually exclusive. Maximum: One. Field Installation: Yes. Prerequisites: #4640.

**Asynchronous Line, Medium Speed (AL) (#1231):** Provides for the attachment of one nonswitched 600 bps Start/Stop communications line. The 3767 terminal can be attached to this feature (at EC 380427 plus EC 380628) via switched or nonswitched lines at 200 or 300 bps and via nonswitched lines at 600 bps. Clocking speed is selected at installation time. Connects to the line via a modem or IBM Line Adapter. The lines are installed in ascending order, A1 through A4. Note: IBM Line Adapters are tied to specific line positions, see Figure 4D. Limitations: See Figure 5, Max. ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG. Maximum: Four. Field Installation: Yes. Prerequisites: #1201.

**Asynchronous Line Pair, Low Speed (ALP) (#1241):** Provides for the attachment of two switched or nonswitched 134.5 bps Start/Stop communications lines. Connects to the line via external IBM or PTT mandatory modems, nonswitched also via IBM line adapters or external telegraph line adapters. Consult your TP Coordinator for RPQ order information when telegraph lines are used -- or, two nonswitched double-current telegraph lines at 50, 75 or 100 bps via external telegraph line adapters. Consult your TP Coordinator for RPQ order information. The lines are installed in ascending order, A1 through A4. Note: IBM Line Adapters are tied to specific line positions, see Figure 4D. Limitations: See Figure 5, Max. ICA Configuration: #1231, #1241 and #7881 cannot be intermixed within the ALG. Maximum: Four. Field Installation: Yes. Prerequisites: #1201.

**IBM Leased Line Adapter (#4743):** A modem for Start/Stop data transmission at 134.5 or 600 bps over nonswitched facilities. This line adapter operates with Leased Line Adapters on other IBM products. Selection between 2-wire and 4-wire operation is made at installation time. See Leased Line Adapter in GA24-3435 for specifications and restrictions. Specify: See Figure 4D. Maximum: See Figure 4D. Field Installation: Yes. Prerequisites: AL (#1231) or ALP (#1241) and a Line Adapter Base (#4792 or #4793) -- also see Figure 4D.

**IBM 1200 bps Line Adapter (#4781):** A modem for BSC data transmission at up to 1200 bps over nonswitched facilities. Also for Start/Stop transmission at 300 or 600 bps over nonswitched facilities to the 3767 terminal. Unclocked and must interface to an SLC (#7141-#7144) or AL (#1231). Attachment is directly to the line via an IBM-provided external cable. Customer Responsibilities, see M2700 pages. Communications Facilities, see M2700 pages. Specify: See Figure 4D. In Japan only, specify code #2943 must be ordered for attachment to the NTT D-1 service. Maximum: See Figure 4D. Field Installation: Yes. Prerequisites: #7141-#7144 or #1231 -- #4792 or #4793. Also see Figure 4D. #1295 or #1296 is required for #4791. 7B0158 and 7B0159 are installed.

**Line Adapter Base 3 (LAB 3) (#4793):** Provides attachment of up to four IBM 1200 bps Line Adapters and up to eight IBM Leased Line Adapters. The Line Adapters are tied to specific line positions. See Figure 4D for configuration and possible line combinations. Maximum: One. Field Installation: Yes. Prerequisites: On 3115-2, LAB 3 requires Expansion Base (#3860) unless RPQs 7B0158 and 7B0159 are installed.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on

a purchased machine to include any number of diskette-only changes ordered on same diskette.

## Synchronous Line Medium Speed Clock (SLC) (#7141-#7144)

#7141 -- Line position S1  
#7142 -- Line position S2  
#7143 -- Line position S3  
#7144 -- Line Position S4

Line positions S1 through S4 must be installed in ascending order.

Each feature provides for the attachment of one switched or non-switched BSC line. The clock can be set by the user for a transmission rate of 600 bps or 1200 bps. Connects to the line via an unclocked modem or PTT mandatory modem. The IBM 1200 bps Line Adapter (#4781) can be used instead of a modem on non-switched lines. Notes: IBM Line Adapters are tied to specific line positions, see Figure 4D. SL (#7151-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. Limitations: See Figure 5, Max. ICA Configuration. #7141 is mutually exclusive with #7151, #7142 with #7152, #7143 with #7153, and #7144 with #7154. Maximum: #7141 through #7144, one each. Field Installation: Yes. Prerequisites: #7100.

## Synchronous Line Medium Speed (SL) (#7151-#7154):

#7151 -- Line position S1  
#7152 -- Line position S2  
#7153 -- Line position S3  
#7154 -- Line position S4

Line positions S1 through S4 must be installed in ascending order.

Each feature provides for the attachment of one switched or non-switched BSC line. Nonswitched lines are with switched network backup are supported. Maximum line speed on nonswitched line is 7200 bps; maximum speed of switched network depends on current regulations of the national PTT. See Figure 2B for detailed speed and facility information. Connects to the line via an external IBM or PTT mandatory modem. The modem must provide clocking. Note: SL (#7151-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. Limitations: See Figure 5, Max. ICA Configuration. #7151 is mutually exclusive with #7141, #7152 with #7142, #7153 with #7143, and #7154 with #7144. Maximum: #7151 through #7154, one each. Field Installation: Yes. Prerequisites: #7100.

**Telegraph Line Pair (TLP) (#7881):** Provides for the attachment of two nonswitched single current telegraph lines at 50 or 75 bps. Attachment to the lines is via an IBM-provided external cable. Lines A1 through A4 are installed in ascending order. Limitations: See Figure 5, Max. ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG. Maximum: Four. Field Installation: Yes. Prerequisites: #1201.

**Modems:** The following IBM modems can be attached to the lines of the 3115 ICA:

Modem	Speed
3976 mdl 1	134.5 bps nonswitched
3976 mdl 2	134.5 bps switched
3976 mdl 3	600/1200 bps
3977 mdl 2	600/1200 bps
3863 mdl 1/2	2400 nonswitched or switched
3872	2400/1200 bps nonswitched
3864 mdl 1/2	4800 bps nonswitched or switched
3874	4800/2400 bps nonswitched
3875	7200/3600 bps nonswitched

**Note:** Consult your TP Coordinator for information on IBM RPQ Modem Products.

FIGURE 1A

Integrated Communications Adapter Schematic Feature Build-Up

ICAE (#4641)	LINE GROUP	LINE INTERFACE
ICA (#4640)	ALG (#1201) (2) (*)	AL(#1231), or ALP (#1241), or TLP (#7881)
		AL(#1231), or ALP (#1241), or TLP (#7881)
		AL(#1231), or ALP (#1241), or TLP (#7881)
		AL(#1231), or ALP (#1241), or TLP (#7881)
	SLG (#7100)	SL(#7151), or SLC (#7141)
		SL(#7152), or SLC (#7142)
		SL(#7153), or SLC (#7143)
		SL(#7154), or SLC (#7144)

ICAE (#4641)	LINE GROUP	Asynch Line Position	Synch Line Position
ICA (#4640)	ALG (#1201) (2) (*)	A1	
		A2	
		A3 (1)*	
		A4 (1)*	
	SLG (#7100)		S1
			S2
			S3 (1)*
			S4 (1)*

- Auto Call Adapter (#1291, #1292, #1295 and #1296) restrict the use of these line positions; see Figure 3.
- ALG (#1201) and SLG (#7121) are mutually exclusive.

\*\* EMEA, AFE not applicable.

FIGURE 1B

	LINE GROUP	LINE INTERFACE
ICA (#4640)	SLG (#7100)	SL(#7151), or SLC (#7141)
		SL(#7152), or SLC (#7142)
		SL(#7153), or SLC (#7143)
		SL(#7154), or SLC (#7144)
		SLHS(#7121) (2)

- ALG (#1201) and SLHS (#7121) are mutually exclusive.

Note: SLHS (#7121) cannot be operated concurrently with lines in positions S1 through S4.

FIGURE 2A\*\* START/STOP TERMINALS

TERMINALS	SPEED (bps)	FACILITIES
2741	134.5	C1, C2, D1
3767 mdl 1, 2 w #7111 or #7113	300	C1, D1
3767 mdl 1, 2, 3 w #7112	600 or 1200	D2
5010 mdl Axx	134.5	C1, C2, D1
	600	D2
	134.5	B1, B2, C1 C2, D1



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## MACHINES

M 3115.8  
MAY 86

5100/5110	300	C1, D1
	45.5	A1
AT&T 83B2/83B3 WU 115A	56.9	A2
	74.2	A3
TWX 33/35	110.0	C3

LINE INTER FACE FEA- TURE	LINE CONTROL SPECIFY
#1241	#9738**
#1231	#9739**
#1231	#9739**
#1241	#9738**
#1231	#9739**
#1241	#9738**
#1231	#9739**
#7881	#9734**
#7881	#9734**
#7881	#9735**
#1241	#9737**

\*\*EMEA, AFE not applicable

FIGURE 2A\* START/STOP TERMINALS

TERMINALS	SPEED (bps)	LINE INTERFACE FEATURE	LINE CONTROL SPECIFY CODE
2741	134.5	#1241	#9738
3767 Mdl 1 & 2 w #7113 or #7111	200 or 300	#1231	#9739
3767 Mdl 1, 2 & 3 w #7112	600	#1231	#9739
5010 mdl AXX	134.5	#1241	#9738
5010 mdl AXX	600	#1231	#9739

5100	134.5	#1241	#9738
5100	300	#1231	#9739
WT Tele- graph Single- Current	50	#7881	#2832
WT Tele- graph Single Current	75	#7881	#2833
WT Tele- graph Double Current	50	#1241(1)	#2914
WT Tele- graph Double Current	75	#1241(1)	#2915
WT Tele- graph Double Current	100	#1241(1)	#2916

- Contact your TP coordinator for RPQ order information.

\* ISG not applicable.

\*\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

FIGURE 2B(1) BINARY SYNCHRONOUS TERMINALS

SPEED(bps)	600	1200
LINE INTERFACE	#7141- #7144	#7141- #7144
FACILITIES	C3	C4
Another 3115 w #4640	X	X
3125 w #4640	X	X
3135, -3, 3138 w #4640	X	X
2701>		X
2703>		X
3704/3705>	X	X
3020 w#2074		X
3025 w #4580		X
S/3 w #2074	X	X
1131 w #7690		X

1826 w #7550		X
2715 mdl 2		X
2780		X
2271		
3275		X
3651 mdl A60 or B60		
3661**		X
3684		X
3741 mdl 2/3747		X
3771, 3773, 3774, 3775		X
3776		
3777		
3780		X
4331 Proc w #1601	X	X
5110		X
5231		X
5265 Communicating Mdl		X
5275***		X
5285, 5288 w #2500	X	X
S/7 w #2074		X
S/32 & S/34****	X	X
Series/1	X	X

SPEED(bps)	1200	2400
LINE INTERFACE	#7141- #7144	#7151- #7154
FACILITIES	D3	C5
Another 3115 w #4640	X	X
3125 w #4640	X	X
3135, -3, 3138 w #4640	X	X
2701>	X	X
2703>	X	X
3704/3705>	X	X
3020 w#2074	X	X

3025 w #4580	X	X
S/3 w #2074	X	X
1131 w #7690	X	X
1826 w #7550	X	X
2715 mdl 2	X	X
2780	X	X
2271	X	
3275	X	
3651 mdl A60 or B60		X
3661**	X	
3684	X	X
3741 mdl 2/3747	X	X
3771, 3773, 3774, 3775	X	X
3776		X
3777		
3780	X	X
4331 Proc w #1601	X	X
5110	X	X
5231	X	X
5265 Communicating Mdl	X	X
5275***	X	
5285, 5288 w #2500	X	X
S/7 w #2074	X	X
S/32 & S/34****	X	X
Series/1	X	X

SPEED(bps)	2400	2400/ 1200
LINE INTERFACE	#7151- #7154	#7151- #7154
FACILITIES	D4, X1M-	D4SB
Another 3115 w #4640	X	X
3125 w #4640	X	X
3135, -3, 3138 w #4640	X	X
2701>	X	X

2703>	X	X
3704/3705>	X	X
3020 w #2074	X	X
3025 w #4580	X	
S/3 w #2074	X	X
1131 w #7690	X	
1826 w #7550	X	
2715 mdl 2	X	
2780	X	X
2271	X	
3275	X	
3651 mdl A60 or B60		
3661**		
3684	X	X
3741 mdl 2/3747	X	
3771, 3773, 3774, 3775	X	X
3776	X	X
3777		
3780	X	X
4331 Proc w #1601	X	X
5110	X	X
5231	X	X
5265 Communicating Mdl	X	
5275***		
5285, 5288 w #2500	X	X
S/7 w #2074	X	
S/32 & S/34****	X	X
Series/1	X	

SPEED(bps)	4800	4800/ 2400
LINE INTERFACE	#7151- #7154, #7131/ #7132	#7151- #7154
FACILITIES	D5, X2M+	C6
Another 3115 w #4640	X	X

3125 w #4640	X	X
3135, -3, 3138 w #4640	X	X
2701>	X	X
2703>	X	X
3704/3705>	X	X
3020 w #2074	X	X
3025 w #4580	X	X
S/3 w #2074	X	X
1131 w #7690	X	X
1826 w #7550	X	X
2715 mdl 2	X	X
2780	X	X
2271	X	
3275	X	
3651 mdl A60 or B60		
3661**		
3684	X	X
3741 mdl 2/3747		
3771, 3773, 3774, 3775	X	X
3776	X	X
3777	X	X
3780	X	X
4331 Proc w #1601	X	X
5110	X	X
5231	X	X
5265 Communicating Mdl		
5275***		
5285, 5288 w #2500	X	X
S/7 w #2074	X	
S/32 & S/34****	X	X
Series/1	X	X

SPEED(bps)	4800/ 2400	7200/ 3600
LINE INTERFACE	#7151-	#7151-

	#7154	#7152
FACILITIES	D5SB	D6
Another 3115 w #4640	X	X
3125 w #4640	X	X
3135, -3, 3138 w #4640	X	X
2701>	X	X
2703>	X	X
3704/3705>	X	X
3020 w#2074	X	X
3025 w #4580	X	
S/3 w #2074	X	X
1131 w #7690		
1826 w #7550		
2715 mdl 2		
2780	X	X
2271		X
3275		X
3651 mdl A60 or B60		
3661**		
3684	X	
3741 mdl 2/3747		
3771, 3773, 3774, 3775	X	
3776	X	
3777	X	X
3780	X	X
4331 Proc w #1601	X	X
5110	X	
5231		
5265 Communicating Mdl		
5275***		
5285, 5288 w #2500	X	
S/7 w #2074		X
S/32 & S/34****	X	X
Series/1		X

\*-----\*

	7200/1
	3600 &

SPEED(bps)	3600/ 1800	19,200
LINE INTERFACE	#7151- #7152	#7121
FACILITIES	D6SB	E1
Another 3115 w #4640	X	X
3125 w #4640	X	X
3135, -3, 3138 w #4640	X	
2701>	X	X
2703>	X*	
3704/3705>	X	X
3020 w#2074	X	X
3025 w #4580		
S/3 w #2074	X	X
1131 w #7690		
1826 w #7550		
2715 mdl 2		
2780	X	
2271	X	
3275	X	
3651 mdl A60 or B60		
3661**		
3684		
3741 mdl 2/3747		
3771, 3773, 3774, 3775		
3776		
3777	X	
3780	X	
4331 Proc w #1601	X	
5110		
5231		
5265 Communicating Mdl		
5275***		
5285, 5288 w #2500		
S/7 w #2074		X
S/32 & S/34****	X	

Series/1 | | X |

SPEED(bps)	40,800	50,000
LINE INTERFACE	#7121	#7121
FACILITIES	E2	E3
Another 3115 w #4640	X	X
3125 w #4640	X	X
3135, -3, 3138 w #4640		
2701>	X	X
2703>		
3704/3705>	X	X
3020 w #2074	X	X
3025 w #4580		
S/3 w #2074	X	X
1131 w #7690		
1826 w #7550		
2715 mdl 2		
2780		
2271		
3275		
3651 mdl A60 or B60		
3661**		
3684		
3741 mdl 2/3747		
3771, 3773, 3774, 3775		
3776		
3777		
3780		
4331 Proc w #1601		
5110		
5231		
5265 Communicating Mdl		
5275***		

5285, 5288 w #2500		
S/7 w #2074	X	X
S/32 & S/34****		
Series/1	X	X

- X1M facility may not be used for communications with a 2703 or a S/360 mdl 25.

+ X2M facility may not be used for communications with a 2703 or a S/360 mdl 25.

\* Contact Special Product Marketing for

RPQ ordering information.

\*\* Switched Network only.

\*\*\* 3115 ICA must use the IBM 1200 bps Modem (#4781 or #4782).

\*\*\*\* S/32 with #2074 & S/34 with #2500.

> On S/360 mdl 22 and up, S/370 or 4300 processor.

(1) EMEA, AFE not applicable.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

## FIGURE 2B\* BINARY SYNCHRONOUS TERMINALS

SPEED(bps)	600/1200	
Line Interface Feature Number	#7141-#7144 or #7151-#7154	
FACILITY	CA2, C2	DA3, D3
1131 w #7690	X	X
1826 w #7550		X
2701	X	X
2703	X	X
2780	X	X
3115-3138 w #4640	X	X
3271, 3274		
3275		
3276		
3651mdlA60,B60		
3651 mdl25,75		
3684	X	X
3704, 3705	X	X
3741 mdl 2, 4	X	X
3747	X	X

3771, 3773, 3774, 3775	X	X
3776	X	X
3777		
3780	X	X
4300 Proc with #1601	X	X
4952		
4953		
4955		
4959		
4987		
5110		
5231		
5231 mdl 2		
5265	X	X
5285, 5288 with #2500	X	X
6240		
6640, 6670		
OS/6		
S/3 with #2074	X	X
S/7 with #2074	X	X
S/32 w #2074	X	X
S/34		
S/360 mdl 20 with #2074	X	X
S/360 mdl 25 with #4580	X	X
MC II	X	X

SPEED(bps)	1200	
Line Interface Feature Number	#7141-#7144 or #7151- #7154	
FACILITY	CA2, C2	DA3, D3
1131 w #7690	X	X
1826 w #7550		X
2701	X	X

2703	X	X
2780	X	X
3115-3138 w #4640	X	X
3271, 3274		X
3275	X	X
3276	X	
3651mdlA60,B60	X	
3651 mdl25,75		
3684	X	X
3704, 3705	X	X
3741 mdl 2, 4	X	X
3747	X	X
3771, 3773, 3774, 3775	X	X
3776	X	X
3777		
3780	X	X
4300 Proc with #1601	X	X
4952		
4953		
4955		
4959		
4987		
5110		
5231		
5231 mdl 2	X	X
5265	X	X
5285, 5288 with #2500	X	X
6240		
6640, 6670		
OS/6		
S/3 with #2074	X	X
S/7 with #2074	X	X
S/32 w #2074	X	X
S/34		
S/360 mdl 20	X	X

with #2074		
S/360 mdl 25 with #4580	X	X
MC II		

\*-----\*

SPEED(bps)	2400		
Line Interface Feature Number	#7151-#7154		
FACILITY	C3	D5	K3
1131 w #7690	X	X	
1826 w #7550		X	
2701	X	X	X
2703	X	X	
2780	X	X	
3115-3138 w #4640	X	X	X
3271, 3274		X	
3275	X	X	
3276	X		X
3651mdlA60,B60	X		
3651 mdl25,75			
3684	X	X	
3704, 3705	X	X	X
3741 mdl 2, 4	X	X	
3747	X	X	X
3771, 3773, 3774, 3775	X	X	X
3776	X	X	X
3777		X	X
3780	X	X	X
4300 Proc with #1601	X	X	X
4952			X
4953			X
4955			X
4959			X
4987			X
5110			X

5231			X
5231 mdl 2	X	X	
5265	X	X	X
5285, 5288 with #2500	X	X	X
6240			X
6640, 6670			X
OS/6			X
S/3 with #2074	X	X	X
S/7 with #2074	X	X	X
S/32 w #2074	X	X	X
S/34			X
S/360 mdl 20 with #2074	X	X	
S/360 mdl 25 with #4580	X	X	
MC II			X

\*-----\*

SPEED(bps)	4800	
Line Interface Feature Number	#7151-#7154	
FACILITY	D6	K4
1131 w #7690	X	
1826 w #7550	X	
2701	X	X
2703	X	
2780	X	
3115-3138 w #4640	X	
3271, 3274	X	
3275	X	
3276		X
3651mdlA60,B60		
3651 mdl25,75		
3684	X	
3704, 3705	X	X
3741 mdl 2, 4		
3747		X

3771, 3773, 3774, 3775		X
3776	X	X
3777	X	X
3780	X	X
4300 Proc with #1601	X	X
4952		X
4953		X
4955		X
4959		X
4987		X
5110		X
5231		
5231 mdl 2	X	
5265		
5285, 5288 with #2500	X	X
6240		
6640, 6670		
OS/6		
S/3 with #2074	X	X
S/7 with #2074	X	
S/32 w #2074	X	X
S/34		X
S/360 mdl 20 with #2074	X	
S/360 mdl 25 with #4580	X	
MC II		

SPEED(bps)	7200
Line Interface Feature Number	#7151-#7154
FACILITY	D7
1131 w #7690	
1826 w #7550	
2701	X
2703	

2780	
3115-3138 w #4640	X
3271, 3274	X
3275	X
3276	
3651mdlA60,B60	
3651 mdl25,75	
3684	
3704, 3705	X
3741 mdl 2, 4	
3747	
3771, 3773, 3774, 3775	
3776	
3777	X
3780	X
4300 Proc with #1601	X
4952	
4953	
4955	
4959	
4987	
5110	
5231	
5231 mdl 2	
5265	
5285, 5288 with #2500	
6240	
6640, 6670	
OS/6	
S/3 with #2074	X
S/7 with #2074	X
S/32 w #2074	X
S/34	
S/360 mdl 20 with #2074	X

S/360 mdl 25 with #4580	
MC II	

\* ISG, AFE not applicable

NOTES:

1. RPQ attachment capabilities are not included.
2. See M2700 pages for additional information in IBM and PTT mandatory modems.
3. Facility meetings:
  - C-Switched line, stand-alone modem
  - CA-Switched line, integrated modem
  - D-Leased line, stand-alone modem
  - DA-Leased line, integrated modem
  - K-Switched data network, standalone DCE

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

FIGURE 2B\* BINARY SYNCHRONOUS TERMINALS

SPEED(bps)	600/1200	
Line Interface Feature Number	#7141-#7144 or #7151-#7154	
FACILITY	CA2, C2	DA3, D3
1131 w #7690	X	X
1826 w #7550		X
2701	X	X
2703	X	X
2780	X	X
3115-3138 w #4640	X	X
3271, 3274		
3275, 3276		
3651mdlA60,B60		
3651 mdl25,75		
3684	X	X
3704, 3705	X	X
3741		
3741 mdl 2, 4	X	X
3747	X	X
3771, 3773, 3774, 3775	X	X
3776	X	X
3777		

3780	X	X
4300 Proc with #1601	X	X
4952		
4953		
4955		
4959		
4987		
5110		
5231		
5231 mdl 2		
5265	X	X
5285, 5288 with #2500	X	X
6240		
6640, 6670		
S/3 with #2074	X	X
S/7 with #2074	X	X
S/32 w #2074	X	X
S/34		
S/360 mdl 20 with #2074	X	X
S/360 mdl 25 with #4580	X	X
OS/6		
MC II	X	X

SPEED(bps)	1200	
Line Interface Feature Number	#7141-#7144 or #7151-#7154	
FACILITY	CA2, C2	DA3, D3
1131 w #7690	X	X
1826 w #7550		X
2701	X	X
2703	X	X
2780	X	X
3115-3138 w #4640	X	X

3271, 3274		X
3275, 3276	X	X
3651mdlA60,B60	X	
3651 mdl25,75		
3684	X	X
3704, 3705	X	X
3741		
3741 mdl 2, 4	X	X
3747	X	X
3771, 3773, 3774, 3775	X	X
3776	X	X
3777		
3780	X	X
4300 Proc with #1601	X	X
4952		
4953		
4955		
4959		
4987		
5110		
5231		
5231 mdl 2	X	X
5265	X	X
5285, 5288 with #2500	X	X
6240		
6640, 6670		
S/3 with #2074	X	X
S/7 with #2074	X	X
S/32 w #2074	X	X
S/34		
S/360 mdl 20 with #2074	X	X
S/360 mdl 25 with #4580	X	X
OS/6		
MC II		

SPEED(bps)	2400		
Line Interface Feature Number	#7151-#7154		
FACILITY	C3	DA3, M3	K3
1131 w #7690	X	X	
1826 w #7550		X	
2701	X	X	X
2703	X	X	
2780	X	X	
3115-3138 w #4640	X	X	X
3271, 3274		X	
3275, 3276	X	X	
3651mdlA60,B60	X		
3651 mdl25,75			
3684	X	X	
3704, 3705	X	X	X
3741			X
3741 mdl 2, 4	X	X	
3747	X	X	X
3771, 3773, 3774, 3775	X	X	X
3776	X	X	X
3777		X	X
3780	X	X	X
4300 Proc with #1601	X	X	X
4952			X
4953			X
4955			X
4959			X
4987			X
5110			X
5231			X
5231 mdl 2	X	X	X
5265	X	X	
5285, 5288			

with #2500	X	X	X
6240			X
6640, 6670			X
S/3 with #2074	X	X	X
S/7 with #2074	X	X	X
S/32 w #2074	X	X	X
S/34			X
S/360 mdl 20 with #2074	X	X	
S/360 mdl 25 with #4580	X	X	
OS/6			X
MC II			X

SPEED(bps)	4800	
Line Interface Feature Number	#7151-#7154	
FACILITY	D6, M4	K4
1131 w #7690	X	
1826 w #7550	X	
2701	X	X
2703	X	
2780	X	
3115-3138 w #4640	X	
3271, 3274	X	
3275, 3276	X	
3651mdlA60,B60		
3651 mdl25,75		
3684		
3704, 3705		
3741		
3741 mdl 2, 4		
3747		
3771, 3773, 3774, 3775		X
3776	X	X
3777	X	X

3780	X	X
4300 Proc with #1601	X	X
4952		X
4953		X
4955		X
4959		X
4987		X
5110		X
5231		
5231 mdl 2	X	
5265		
5285, 5288 with #2500	X	X
6240		
6640, 6670		
S/3 with #2074	X	X
S/7 with #2074	X	X
S/32 w #2074	X	X
S/34		X
S/360 mdl 20 with #2074	X	
S/360 mdl 25 with #4580	X	
OS/6		
MC II		

SPEED(bps)	7200
Line Interface Feature Number	#7151-#7154
FACILITY	D7
1131 w #7690	
1826 w #7550	
2701	X
2703	
2780	
3115-3138 w #4640	X
3271, 3274	X

3275, 3276	X
3651mdlA60,B60	
3651 mdl25,75	
3684	
3704, 3705	X
3741	
3741 mdl 2, 4	
3747	
3771, 3773, 3774, 3775	
3776	
3777	X
3780	X
4300 Proc with #1601	X
4952	
4953	
4955	
4959	
4987	
5110	
5231	
5231 mdl 2	
5265	
5285, 5288 with #2500	
6240	
6640, 6670	
S/3 with #2074	X
S/7 with #2074	X
S/32 w #2074	X
S/34	
S/360 mdl 20 with #2074	X
S/360 mdl 25 with #4580	
OS/6	
MC II	

\* ISG, EMEA not applicable

NOTES:

1. RPQ attachment capabilities are not included.
2. See M2700 pages for additional information in IBM and PTT mandatory modems.
3. Facility meetings:  
C-Switched line, stand-alone modem  
CA-Switched line, integrated modem  
D-Leased line, stand-alone modem  
DA-Leased line, integrated modem  
K-Switched data network, standalone DCE  
M-Nonswitched data network, standalone DCE

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

FIGURE 3\* AUTO CALL ADAPTERS

Auto Call Adapter Feature Code	Provides Auto Call for Line Position	Prereq-uisites	Precludes Line Positions
#1291	A1 (1)	#1241	A3 and A4
#1292	A2 (1)	#1241 & #1291	A3 and A4
#1295	S1	#7141 & #7151	S3 and S4
#1296	S2	#7142 or #7152 & #1295	

\* EMEA, AFE not applicable

1. Provides Autocall in this line position for the first line of the synchronous line pair (#1241).

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

FIGURE 4A\* IBM LINE ADAPTERS

	BSC	Start/Stop up to 600 bps	Start/Stop (1) up to 1200 bps
FACILITY	IBM 1200 bps LINE ADAPTER	IBM LEASED LINE ADAPTER	IBM 1200 bps LINE ADAPTER
Non-switched pt-to-pt	#4781	#4743	#4781
Non-switched multi-point control	#4781	#4743	#4781

Non-switched multi-point tributary	#4781	-	-
Switched with auto answer	#4782	-	-
Switched with auto answer and autocall	#4791	-	-

\* EMEA, AFE not applicable

- Only with the 3767 terminals.

FIGURE 4A\* IBM LINE ADAPTERS

FACILITY	BSC	Start/Stop up to 600 bps	Start/Stop (1) up to 600 bps
	IBM 1200 bps LINE ADAPTER	IBM LEASED LINE ADAPTER	IBM 1200 bps LINE ADAPTER
Non-switched pt-to-pt	#4781	#4743	#4781
Non-switched multi-point control	#4781	#4743	#4781
Non-switched multi-point tributary	#4781	-	-

\* ISG not applicable.

- Only with the 3767 terminals. EMEA - UK Note: #4743 and #4781 may also be used on non-PO provided and maintained lines in UK.

FIGURE 4C\*\* LINE ADAPTER BASE 2 (#4792)

Maximum, 6 IBM Line Adapters

LINE POSITION	LINE ADAPTER	LINE ADAPTER POSITION SPECIFY	PREREQ
A1 1st line	#4743	#9463*	#1241
A1 2nd	#4743	#9464*	#9463

line			
A2 1st line	#4743	#9465*	#1241
A2 2nd line	#4743	#9466*	#9465
	#4781	#9471*	#7141
S1	#4782	#9473*	#7141
	#4791	#9475*	#7141
	#4781	#9472*	#7142
S2	#4782	#9472*	#7142
	#4791	#9476*	#7142

LINE POSITION	NOTE
A1 1st line	
A1 2nd line	
A2 1st line	
A2 2nd line	
S1	Select one line adapter
S2	Select one line adapter

\*\* EMEA, AFE not applicable

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

FIGURE 4D LINE ADAPTER BASE 3 (#4793)...

Maximum, 12 IBM Line Adapters

LINE POSITION	LINE ADAPTER	LINE ADAPTER POSITION SPECIFY	PREREQ
A1 1st line	#4743	#9485*	#1241
A1 2nd line	#4743	#9486*	#9485

A2 1st line	#4743	#9487*	#1241
A2 2nd line	#4743	#9488*	#9487
A3 1st line	#4743	#9489*	#1241
A3 2nd line	#4743	#9490*	#9489
A4 1st line	#4743	#9491*	#1241
A4 2nd line	#4743	#9492*	#9491
S1	#4781	#9493*	#7141
S2	#4781	#9494*	#7142
S3	#4781	#9495*	#7143
S4	#4781	#9496*	#7144

LINE POSITION	NOTE
A1 1st line	
A1 2nd line	
A2 1st line	
A2 2nd line	
A3 1st line	
A3 2nd line	
A4 1st line	
A4 2nd line	
S1	
S2	
S3	
S4	

... OR ...

A1(2)	#4743 or #4781	#9481, #9501*	#1231	Excludes line adapter in position
-------	----------------	---------------	-------	-----------------------------------

A2(2)	#4743 or #4781	#9482, #9502*	#1231	Excludes line adapter in position S3 (#9495)
A3(2)	#4743 or #4781	#9483, #9503*	#1231	Excludes line adapter in position S2 (#9494)
A4(2)	#4743 or #4781	#9484, #9504*	#1231	Excludes line adapter in position S1 (#9493)
S1	#4781	#9493*	#7141	Excludes line adapter in position A4 (#9484)
S2	#4781	#9494*	#7142	Excludes line adapter in position A3 (#9483)
S3	#4781	#9495*	#7143	Excludes line adapter in position A2 (#9482)
S4	#4781	#9496*	#7144	Excludes line adapter in position A1 (#9481)

(2) #4781 may be used only with the 3767 terminal. EMEA - UK  
Note: #4743 and #4781 may also be used on non-PO provided and maintained lines in UK.

FIGURE 5\* MAXIMUM ICA CONFIGURATION

All lines/line pairs are assigned load factors. The sum of all load factors must not exceed 100%.

LOAD FACTOR IN %

ASYNCHRONOUS LINES	1-2 Line Pairs (1-4 lines)	3-4 Line Pairs (5-8 lines)
TPL at 45.5 & 56.9 bps	20	20
TPL at 74.2 & 75 bps	20	40
APL at 110 & 134.5 bps	20	40
ALG up to 4 lines		
AL at 300/	20	

600/1200 bps

SYNCHRONOUS LINES	1-2 Lines		3-4 Lines	
	Auto-poll Not Used	Auto-poll Used	Auto-poll Not Used	Auto-poll Used
SLG w max 1200 bps	20	25	20	25
SLG w max 2400 bps	20	25	40	50
SLG w max 4800 bps	40	50	80	100
SLG w max 7200 bps	60	75		
	1 Line pt to pt			
SLHS at max 50K bps	100			

\* EMEA, AFE not applicable.

## FIGURE 5\*\* MAXIMUM ICA CONFIGURATION

All lines/line pairs are assigned load factors. The sum of all load factors must not exceed 100%.

### LOAD FACTOR IN %

ASYNCHRONOUS LINES	1-2 Line Pairs (1-4 lines)	3-4 Line Pairs (5-8 lines)
TPL at 50 bps	20	20
TPL at 75 bps	20	40

APL at 50 bps	20		20	
APL at 75, 100 & 134.5 bps	20		40	
ALG up to 4 lines				
AL at 200/300/600 bps	20 line pairs			
SYNCHRONOUS LINES	1-2 Lines		3-4 Lines	
	Auto-poll Not Used	Auto-poll Used	Auto-poll Not Used	Auto-poll Used
	20	25	20	25
	20	25	40	50
	40	50	80	100
	60	75		

\*\* ISG not applicable.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

## MODEL CONVERSIONS

Field installable -- model downgrade from 3115-2 to 3115-0 is not recommended for field installation.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3117 SCANNER

### PURPOSE

The 3117 Scanner is a desk-top, flat bed page scanner, which scans various kinds and sizes of paper documents. A flat bed scanner is especially suitable to scan images in bound documents, signature cards, carbon-backed or odd-sized documents. It has the resolution of up to 240 (horizontal) x 240 (vertical) picture elements per inch (94.5 x 94.5 picture elements per centimeter), with a scan area of letter or A4 size. It provides image input to both personal and host computer systems.

Related products used with the scanner are the 3117 Adapter as an IBM PC and an IBM Personal System/2 Model 30 feature, the 3117 Adapter/A as an IBM Personal Computer Models 50, 60, 80 feature, and the 3117 Extension Unit as a 3117 Scanner feature. These features facilitate the attachment of the 3117 Scanner to a 3193 Display Station, or to the IBM Personal System/2 Models 30, 50, 60, 80, or to the following IBM Personal Computers: IBM PC, IBM PC XT, IBM Personal Computer AT, IBM 3270 PC, and IBM 3270 Personal Computer AT. The 3117 Adapter and the 3117 Adapter A allow the scanner to send image data to an IBM Personal Computer or IBM Personal System/2 without compression for further processing. The 3117 Extension Unit compresses the image data in the 3117 Scanner. Image data compression is a technique to save transmission time and reduce storage requirements.

### MODELS

**Model 010:** Low Voltage (120 V, 50/60 Hz)

**Model 011:** High Voltage (220V - 240V, 50/60 Hz)

**Limitations:** Only one 3117 Scanner can be attached to an IBM Personal Computer, or an IBM Personal System/2, or a 3193 Display Station.

The Expanded Memory Adapter (XMA) for the 3270 Personal Computer family is not supported.

If the Enhanced 5250 Emulation Adapter is installed in the IBM PC, the Asynchronous Communications Adapter or the Serial/Parallel Adapter should not exceed a speed of 9600 bps. For System/36 or System/38 attachment, other operating restrictions will be identified in HONE/EQUAL.

Some inks of red, orange or yellow color may not be successfully scanned by the 3117. The maximum weight of a document placed on the scanner's flat-bed is 1k (2.2 lbs.). The scanner flat-bed opening is 216 x 297mm (8.5 x 11.7 in.). The scanner optics cannot scan information within approximately 1.5mm (0.06 in.) of the top and bottom edges of the flat-bed's opening and approximately 3.1mm (0.12 in.) of both sides of the flat-bed's opening.

**Prerequisites:** The prerequisites for each configuration are as follows:

- 3117 Scanner attached to an IBM Personal Computer and IBM Personal System/2 Model 30 via the 3117 Adapter, and to an IBM Personal System/2 Models 50, 60, 80 via the 3117 Adapter A:
  - Minimum 256KB main storage (to run diagnostics). Note: 512KB for 3270 PC family members.
  - A 3117 Adapter (#4925) or a 3117 Adapter A (#1029)
  - One full card slot in an IBM Personal Computer or an IBM Personal System/2 system unit.
  - A 3117 Personal Computer cable (#3005, P/N 6456807)

- 3117 Scanner configured with the 3117 Extension Unit and attached to an IBM Personal Computer and an IBM Personal System/2:
  - A 3117 Extension Unit (#4555)
  - One Asynchronous Communication Adapter (#2074), or one Serial/parallel Communication Adapter (#0215), or one High Speed Adapter (#4920) or one High Speed Adapter A (#1028)
  - One Communications Adapter Cable (#2067, P/N 1502067), for Asynchronous Communication Adapter and High Speed Adapter, or one Personal Computer AT Serial Adapter Cable (#0217, P/N 6450217) for Serial/Parallel Communications Adapter and High Speed Adapter A.

**Note:** When the 3117 Scanner is attached to a 3270 PC family member it is strongly recommended that 512KB of main storage and the High Speed Adapter be used.

The 3117 Scanner attached to the IBM Personal Computer is supported by the Image Support Facility 2, a licensed program.

- 3117 Scanner attached to an IBM 3193 Display Station.
  - A 3117 Extension Unit (#4555)
  - A 3193 Display Station
  - A 3174 or 3274 Control Unit Mdl 31A, 31C, 31D, 41A, 41C, 41D, 51C, and 61C with configuration support D at release level 65 or higher.
  - A Communications Adapter Cable (#2067, P/N 1502067)
  - GDDM version 2 release 1 or higher

**Customer Setup (CSU):** Yes, CSU allowance is one day.

### HIGHLIGHTS

- Compact desk-top flat-bed scanner allowing the scanning of a page from bound documents, and of irregular size or paper weight.
- Scan speed per page -- approximately 30 seconds (8-1/2 in. x 11 in. page)
- Program selectable scanning resolutions
- Program specifiable partial page scan
- Program selectable digital halftone emulating grey levels of pictures
- Image data compression\*
- Contrast control via dynamic thresholding and edge enhancement\*

\* Note: Requires 3117 Extension Unit.

### DESCRIPTION

The 3117 Scanner is a desk-top, flat-bed page scanner with a small footprint, light weight, low noise and heat generation, for use with an IBM Personal Computer, or an IBM Personal System/2, or a 3193 Display Station.

The scanner is capable of scanning up to letter or A4 size images. The flat-bed design facilitates scanning a page in a bound document, a part of a large page or paper with odd size, shape or paper

weight. The scanner can scan a letter size (8-1/2 in. x 11 in.) or A4 size page in approximately 30 seconds.

Partial page scan is provided under program control. One or more rectangular areas can be defined for selective scanning within a page. Through the use of this function, unnecessary information can be eliminated, thus reducing the image data volume. The user can control darkness, contrast, and half-toning for each rectangular area individually.

Some inks of red, orange or yellow color may not be successfully scanned by the 3117. The maximum weight of a document placed on the scanner's flat-bed is 1K (2.2 lbs.). The scanner flat-bed opening is 216 x 297mm (8.5 x 11.7 in.). The scanner optics cannot scan information within approximately 1.5mm (0.06 in.) of the top and bottom edges of the flat-bed's opening and approximately 3.1mm (0.12 in.) of both sides of the flat-bed's opening.

The scanner has a resolution of up to 240 x 240 pels (Picture Elements) per inch. Horizontal and vertical scanning resolution are program selectable and can be:

- 240 x 240 pels per inch (94.5 x 94.5 pels per centimeter)
- 240 x 120 pels per inch (94.5 x 47.2 pels per centimeter)
- 120 x 120 pels per inch (47.2 x 47.2 pels per centimeter)

Darkness control is controlled by the user by selecting appropriate threshold level via program control, enabling the scanner to scan a darker copy, a lighter copy or a colored original document.

Digital half-toning is provided to improve the quality of scanned pictures by emulating grey levels. Up to 16 levels of digital halftones can be supported. Digital half-toning makes use of a matrix of 4 x 4 pels to determine the grey level of the scanned image.

The 3117 Extension Unit makes use of an Intel 80186 (TM) micro-processor to provide additional image processing power in the scanner. The extension unit provides four additional capabilities to the 3117 Scanner, including:

- Attachment to the IBM Personal Computer and the IBM Personal System/2 via various general purpose communication adapters (as described in the paragraph below).
- Attachment to the 3193 Display Station
- Image compression in the scanner
- Contrast control

The scanner works in three environments: IBM Personal Computer and IBM Personal System/2 Model 30 attachment, IBM Personal System/2 Models 50, 60, 80 attachment, and 3193 Display Station attachment. The 3117 Scanner can be attached to an IBM Personal Computer and an IBM Personal System/2 via the 3117 Adapter, or the 3117 Adapter A, or the 3117 Extension Unit. The 3117 Adapter is a feature of the IBM Personal Computer and the IBM Personal System/2 Model 30 and is installed in a system unit of an IBM Personal Computer and an IBM Personal System/2 Model 30. The 3117 Adapter A is a feature of the IBM Personal System/2 Models 50, 60, 80 and is installed in a system unit of an IBM Personal System/2 Models 50, 60, 80. When the 3117 Extension Unit is installed on the scanner, the scanner attaches to the IBM Personal Computer and the IBM Personal System/2 through one of the following PC adapters: the Asynchronous Communication Adapter, or the Serial/Parallel Communication Adapter, or the High Speed Adapter, or the High Speed Adapter A.

For System/36 or System/38 attached PCs, the asynchronous communication adapter speed should not exceed 9,600 bps. For System/36 or System/38 attachment, other operating restrictions will be identified in HONE/EQUAL.

The scanner can also attach directly to a 3193 Display Station via the 3117 Extension Unit.

Scanning of documents results in an image bit map. The size of the bit map is dependent primarily upon the pel resolution selected by the operator under program control. For example, when an 8-1/2 x 11 inch page is scanned at 240 x 240 pel resolution, the resulting bit map can be over 700K bytes of information. The large amount of data can be more efficiently handled by compressing the raw image bit map. The objective of compression techniques is to reduce the amount of data needed to represent the scanned image. The

method used by IBM's Image products to reduce or compress the scanned image data is called Modified Modified Read (MMR). It is a very efficient technique which can achieve compression ratios of 27 to 1, on average. Note: The compression ratio for a specific document depends on the document's image characteristics.

The 3117 Adapter and the 3117 Adapter A allow the 3117 Scanner to send image data to an IBM Personal Computer and an IBM Personal System/2 without compression for further processing or for compression of the raw image data by a program running in the IBM Personal Computer and the IBM Personal System/2. For example, compression can be done by the Image Support Facility 2 licensed program running in an IBM Personal Computer and an IBM Personal System/2.

The 3117 Extension Unit allows for compression of image data in the 3117 Scanner. Under program control, the 3117 Extension Unit will also send raw image data in addition to compressed image data.

Contrast control is achieved using dynamic thresholding and edge enhancement functions of the 3117 Extension Unit. These functions are useful for capturing images with various quality levels, especially for scanning a low contrast image against its background. The functions also make the edges of characters or lines look sharper and crisper. The edge enhancement is especially useful when the image consists of pictures and characters using digital halftone. Contrast level is selectable under program control.

The 3117 Scanner attaching to a 3193 Display Station is supported by:

GDDM Version 2, Release 1 or higher  
GDDM-IVU (Image View Utility)

Operating Systems and Subsystems:

MVS/TSO  
MVS/CICS  
VM/CMS  
VSE/CICS

The 3117 Scanner attached to an IBM Personal Computer and an IBM Personal System/2 is supported by the Image Support Facility 2 licensed program.

**Publications:** The following publications are shipped with the products at no charge for the initial copy. Additional copies are available for a fee.

- "Guide to Operations for the IBM 3117 Scanner and the 3117 Adapter", GA18-2477 (includes 5.25-inch diagnostic diskette)
- "Supplement to Guide to Operations for the IBM 3117 Scanner and 3117 Adapter", GK2T-0954 (includes 3.5-inch diagnostic diskette)
- "Guide to Operation for the 3117 Adapter/A", GK2T-0950 (includes 3.5-inch diagnostic diskette)
- "Guide to Operations for the 3117 IBM Scanner and the Extension Unit", GA18-2478

The GA18-2477 and the GK2T-0954 are shipped with the 3117 Adapter, the GK2T-0950 is shipped with the 3117 Adapter/A, and the GA18-2478 is shipped with the 3117 Extension Unit.

The following languages for each publication are available:

Language	Item Number	Order Number
English US	6456831	GA18-2477
Canadian/ French	65X1747	GA09-0375
Spanish	65X1745	GA10-8813

"Supplements to Guide to Operations for the IBM 3117 Scanner and the 3117 Adapter".

Language	Item Number	Order Number
English US	65X1877	GK2T-0954
Spanish	65X1891	GY10-4008

"Guide To Operations for the IBM 3117 Adapter/A".

Language	Item Number	Order Number
English US	65X1922	GK2T-0950
Spanish	65X1951	GK10-0001

"Guide To Operations for the IBM 3117 Scanner and the Extension Unit".

Language	Item Number	Order Number
English US	6456839	GA18-2478
Canadian/French	6456868	GA09-0376
Spanish	6456863	GA10-8830

The following publications are available for a fee.

- "Hardware Maintenance and Service for IBM 3117 Scanner", SY18-2159 (includes 5.25-inch diagnostic diskette)
- "Supplement to Hardware Maintenance and Service for IBM 3117 Scanner", SK2T-0956 (includes 3.5-inch diagnostic diskette)
- "Hardware Maintenance and Service for the 3117 Adapter/A", SK2T-0952 (includes 3.5-inch diagnostic diskette)
- "Technical Reference for IBM 3117 Scanner", SC18-2105
- "Technical Reference for the 3117 Adapter/A", SC18-2153

SLSS is available for order number and by product number.

The following languages are available for "Hardware Maintenance and Service for IBM 3117 Scanner":

Language	Item Number	Order Number
English US	65X1841	SY18-2159
French	65X1843	SY11-1018

"Supplements to Hardware Maintenance and Service for IBM 3117 Scanner".

Language	Item Number	Order Number
English US	65X1874	SK2T-0956
French	65X1894	SY11-1036

Hardware Maintenance and Service for the 3117 Adapter A.

Language	Item Number	Order Number
English US	65X0822	SK2T-0952
French	94X2377	SY11-1029

"Technical Reference for IBM 3117 Scanner"

Language	Item Number	Order Number
English US	65X1844	SC18-2105

"Technical Reference for the IBM 3117 Adapter A".

Language	Item Number	Order Number
English US	65X1844	SC18-2105

English US 65X0823 SC18-2153

Note: Technical References are available in English US only.

## SPECIFY

Unless indicated otherwise, these specify features are available only at time of manufacture.

### Power

Model 010: Low Voltage (120 V AC, 1-phase, 50/60 Hz):  
No specify required  
Model 011: High Voltage (220 V - 240 V, 1-phase, 50/60 Hz)

### Power Cord: Specify:

#2723 (P/N 6392670) 1.8m, Low -- All Countries  
#1017 (P/N 6952320) 2.8m, High -- Indonesia  
#1019 (P/N 6952356) 2.8m, High -- Hong Kong, Malaysia, Singapore  
#1025 (P/N 1838574) 2.8m, High -- Thailand, Peru  
#1026 (P/N 6952374) 2.8m, High -- Chile  
#1027 (P/N 6952291) 2.8m, High -- Argentina  
#1020 (P/N 6952311) 2.8m, High -- Australia, New Zealand

## MODEL CONVERSIONS (NONE)

## SPECIAL FEATURES

**Personal Computer Cable (#3005, P/N 6456807):** Connects the 3117 Scanner to the 3117 Adapter (IBM Personal Computer and Personal System/2 model 30 feature #4925) and to the 3117 Adapter/A (IBM Personal System/2 models 50, 60, 80 feature #1029). Prerequisite: One 3117 Adapter or 3117 Adapter/A. Limitation: Cannot operate with the 3117 Extension Unit (#4555). CSU: Yes.

**Extension Unit (#4555, P/N 6456809):** Provides the ability to attach the scanner to the 3193 Display Station or IBM Personal Computer and the IBM Personal System/2 models 30, 50, 60, and 80. Image data compression, dynamic thresholding, and edge enhancement capabilities are built in to provide improved performance, improved contrast and sharper images via program control. Maximum: One. Prerequisite: For IBM Personal Computer attachment, one of the following PC adapters and one of the following associated cables:

- Adapters: Asynchronous Communication Adapter (#2074), Serial/Parallel Communication Adapter (#0215), or High Speed Adapter (#4920), or High-Speed Adapter/A (#1028).
- Cables: One Communications Adapter cable (#2067, P/N 1502067) for Asynchronous Communication Adapter and High Speed Adapter, or one Personal Computer-AT Serial Adapter Cable (#0217, P/N 6450217) for Serial/Parallel Communications Adapter and High-Speed Adapter/A.

For IBM 3193 Display Station attachment, one Communications Adapter Cable (#2067, P/N 1502067) Limitation: Cannot operate with 3117 PC Adapter (#4925) and 3117 Adapter/A. CSU: Yes.

Shipping manuals: The "Guide to Operations for IBM 3117 Scanner and the Extension Unit" is shipped with the 3117 Extension Unit.

Specify one:

Language	Number	Item Number	Country
English US	#2721	6456839	AG-APG
Spanish	#2748	6456863	Argentina
Canadian French	#2750	6456868	Canada

**IBM** IBM Canada Ltd.

**MACHINES**

**M 3117.4**  
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**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 3118 SCANNER

### PURPOSE

The IBM 3118 Scanner, is a high quality, compact, desk-top, medium speed, feed-through page scanner, having an average scanning speed of 12 seconds per page, and up to 240 (horizontal) x 240 (vertical) picture elements per inch (94.5 X 94.5 picture elements per centimeter) resolution. It is designed to offer image-capturing capabilities for IBM 3270 users and IBM Personal Computer users, and IBM Personal System/2 users. It attaches to the 3193 Display Station to communicate with the host system, or to an IBM Personal System/2, and to an IBM Personal Computer via the PC Asynchronous Communication Adapter, the Serial/Parallel Communication Adapter, or the High Speed Adapter. The 3118 Scanner attaches to the following IBM Personal Computers: IBM PC, IBM PC-XT, IBM Personal Computer-AT, IBM 3270 PC, and IBM 3270 Personal Computer-AT.

The Automatic Document Feed (ADF) provides the capability to automatically feed and scan up to 30 sheets of paper stacked on the chute of the IBM 3118 Scanner.

The High-Speed Adapter is a feature of the IBM Personal Computers and the IBM Personal System/2 model 30. The High-Speed Adapter/A is a feature of the IBM Personal System/2 models 50, 60, 80. The High-Speed Adapter and the High-Speed Adapter/A provide a 1M bps RS-422 interface. These adapters are designed to operate with the 3118 Scanner, and maximize the scanning performance of the 3118 Scanner.

### MODELS

**Model 010:** 100-127V AC, no ADF

**Model 011:** 200-240V AC, no ADF

**Model 020:** 100-127V AC, includes ADF

**Model 021:** 200-240V AC, includes ADF

**Limitations:** Only one 3118 Scanner will attach to a 3193 Display Station, to an IBM Personal Computer, or to an IBM Personal System/2.

The Expanded Memory Adapter (XMA) for the IBM 3270 Personal Computer family is not supported.

If the Enhanced 5250 Emulation Adapter is installed in the IBM PC, the Asynchronous Communications Adapter or the Serial/Parallel Adapter should not exceed a speed of 9600 bps. For S/36 or S/38 attachment, other operating restrictions will be identified in HONE/EQUAL.

Certain paper types are not appropriate for scanning by the 3118 Scanner such as:

- Multi-part forms
- Carbon coated papers
- Glue coated papers
- Chemically coated papers

Pale yellowish-green ink may not be scanned as it is recognized by the scanner as white.

To ensure that the entire image on a page will be scanned, margins of the following sizes should be allowed:

Top: 3mm (0.12 inch) from the top edge of the paper  
Bottom: 3mm (0.12 inch) from the bottom edge of the paper  
Sides: 5mm (0.20 inch) from both sides of 8.5-inch width paper

**Prerequisites:** Prerequisites for attaching to the 3193 Display Station are:

- 3193 Display Station
- 3174 or 3274 Control Unit model 31A, 31C, 31D, 41A, 41C, 41D, 51C, and 61C with configuration support D at release level 65 or higher
- Communications Adapter Cable (#2067, P/N 1502067)
- GDDM Version 2, Release 1 or higher

Prerequisites for attaching to an IBM Personal Computer and an IBM Personal System/2 are:

- An IBM Personal Computer (PC, PC XT, Personal Computer-AT, 3270 PC or 3270 Personal Computer-AT) or an IBM Personal System/2 models 30, 50, 60, 80.
- An IBM PC display/display adapter (5151 Monochrome Display with EGA, 5153 Color Display, 5154 Enhanced Color Display, or 5272 Color Display) or an IBM Personal System/2 display/display adapter (8503 Display, 8512 Display, 8513 Display).
- A High-Speed Adapter (#4920), a High-Speed Adapter/A (#1028), an Asynchronous Communication Adapter (#2074), or a PC Serial/Parallel Communication Adapter (#0215).
- When attaching the 3118 to the PC via the Asynchronous Communications Adapter in the 5150, 5160 or 5271, the Communications Adapter Cable (P/N 1502067) is used. When attaching the 3118 to the IBM Personal Computer and the IBM Personal System/2 model 30 via the Serial/Parallel Communications Adapter in the 5170 or 5273, 8520, the Serial Adapter Cable (P/N 6450217) is used. When attaching the 3118 to the IBM Personal Computer and the IBM Personal System/2 model 30 via the High Speed Adapter in the 5150, 5160, 5271, 5170, 5273, or 8530 the Communications Adapter Cable is used. When attaching the 3118 to the IBM Personal System/2 models 50, 60, 80 via the High-Speed Adapter/A in the 8550, 8560, or 8580 the Serial Adapter Cable is used.
- Image Support Facility 2 licensed program for device support.

**Note:** The High-Speed Adapter is a feature of the IBM Personal Computer and the IBM Personal System/2 model 30. The High-Speed Adapter/A is an IBM Personal System/2 model 50, 60, 80 feature. These adapters provide a 1M bps RS-422 interface and are designed to operate with the 3118 Scanner, and maximize the performance of the scanner.

When the 3118 Scanner is attached to a 3270 PC family member, it is strongly recommended that the High Speed Adapter be used.

**Customer Setup (CSU):** Yes, one day.

### HIGHLIGHTS

- A compact light-weight desk-top scanner with small footprint.
- Attachment of the 3118 Scanner to the 3193 Display Station through a 38.4K bps RS-422 interface, or attachment to an IBM Personal Computer and an IBM Personal System/2 via the High-Speed Adapter or the High-Speed Adapter/A with a 1M bps RS-422 interface, the Asynchronous Communication Adapter, the Serial/Parallel Adapter with up to 9600 bps RS-232-C interface.
- Handling of a wide variety of paper sizes.
- A built-in paper stacker and paper chute with an adjustable paper guide.
- The Automatic Document Feed feeds up to 30 sheets of paper continuously.
- Program selectable scanning resolutions.
- Scan speed per letter-size page with 240 x 240 picture elements per inch with compression: 12 seconds (average).
- Two dimensional image data compression at an average of 27 to 1 compression ratio at 240 x 240 pels per inch resolution.

## MACHINES

- Interface to the 3193 Display station through a 38.4K bps RS-422 interface.
- Program selectable darkness control.
- Program selectable contrast control with dynamic threshold and edge enhancement technology.
- Program specifiable digital half-toning emulating grey levels of pictures.
- Program specifiable partial page scanning.

The 3118 Scanner can be attached to the 3193 Display Station through a 38.4K bps RS-422 interface, or it can be attached to an IBM Personal System/2 models 30, 50, 60, 80, and to an IBM Personal Computer: the IBM PC, PC-XT, Personal Computer-AT, 3270 PC, or 3270 Personal Computer-AT, via the High Speed Adapter with 1M bps RS-422 interface, the PC Asynchronous Communication Adapter, the PC Serial/Parallel Adapter with up to 9600 bps RS-232-C interface.

The 3118 Scanner is a desk-top, feed-through, page scanner with a small foot print, light weight, designed to be compact for use on a desk with an 3193 Display station or with an IBM Personal Computer, or with an IBM Personal System/2.

It allows for scanning of pages of various sizes, from widths of 66mm (2.6 inches) to 216mm (8.5 inches) and from lengths ranging between 99mm (3.9 inches) and 356mm (14 inches), with an adjustable paper guide. Papers of weights from 49 g/square meter (13 pounds) to 187 g/square meter (50 pounds) may be scanned. The thickness of the paper may range between 0.06mm (0.0024 inch) to 0.20mm (0.0078 inch).

Horizontal and vertical scanning resolution is program selectable and may be any of the following:

- 94.5 x 94.5 pels per centimeter (240 x 240 pels per inch)
- 94.5 x 47.2 pels per centimeter (240 x 120 pels per inch)
- 47.2 x 47.2 pels per centimeter (120 x 120 pels per inch)

The scanner can scan a letter size page in 12 seconds average with 240 x 240 picture elements per inch resolution and with compression. The speed may vary depending on the paper size, characteristics of the image, the application programs or communication speed. Scanning speed of the 3118 Scanner will degrade when communicating with the IBM Personal Computer and the IBM Personal System/2 model 30 via the Asynchronous Communication Adapter or the Serial/Parallel Adapter since these adapters are limited to 9600 bps. For S/36 or S/38 attached to the IBM Personal Computer and the IBM Personal System/2 model 30, the asynchronous communication adapter speed should not exceed 9600 bps. For S/36 or S/38 attachment, other operating restrictions will be identified in HONE/EQUAL.

The scanner takes advantage of the increased processing power of the high performance Intel 80186 (TM) microprocessor to handle such functions as compression, digital halftone, darkness and contrast control, dynamic thresholding, edge enhancement, partial page scan and others.

Compression of the image data is performed in the 3118 Scanner using the Modified Modified Read (MMR) compression method. The average compression ratio is 27 to 1 in 240 x 240 pels per inch resolution.

**Note:** Compression ratio will vary and depends on image content characteristics.

Darkness control is specified by the user through the selection of an appropriate threshold level via program control, which will enable scanning of a darker copy, a lighter copy or a colored original document.

Digital halftoning is provided to improve the quality of scanned pictures by providing emulated grey levels. Up to 16 levels or gradations of grey can be supported. Digital halftoning makes use of a matrix consisting of 16 pels (4 x 4) to determine the grey level of the scanned image.

Contrast control is achieved using dynamic thresholding and edge enhancement functions. These functions are useful for capturing images of varying quality levels, and especially for scanning an image where there is low contrast between the image and its background. Edge enhancement also makes the edges of characters or lines look sharper and crisper. Edge enhancement is especially useful when the image consists of pictures and characters and when digital halftoning is used. An appropriate contrast level is selectable under program control.

The 3118 Scanner provides the user with partial page scanning capability. This function allows a user to define one or more rectangular areas to be scanned within a page, and helps eliminate unnecessary image data volume transmission and storage requirements. The user can control darkness, contrast, and halftoning for each rectangular area individually.

The Automatic Document Feed continuously feeds and scans up to 30 sheets of paper, not exceeding 3mm (0.12 inch) in total thickness, from the chute of the 3118 Scanner. With the Automatic Document Feed installed in the 3118, paper weighing from 49g/sq.m (13 lbs.) to 120g/sq.m (32 lbs.) may be scanned. The thickness of the paper may range between 0.06mm (0.0023 inch) to 0.12mm (0.0046 inch).

The 3118 Scanner attaching to a 3193 Display Station is supported by:

GDDM Version 2, Release 1 or higher  
GDDM-IVU

Operating Systems and Subsystems:

MVS/TSO  
MVS/CICS  
VM/CMS  
VSE/CICS

The 3118 Scanner attaching to an IBM Personal Computer and IBM Personal System/2 is designed to operate with the Image Support Facility 2 licensed program.

The 3118 Scanner with Automatic Document Feed attached to a 3193 Display Station is supported by GDDM Version 2, Release 1. "Technical News Letter", GN18-2387, to "IBM 3193 Display Station Description", GA18-2364-1, is available from Mechanicsburg. The TNL describes the additional data stream support by the 3193 Display Station for the Automatic Document Feed. This TNL also documents corresponding support on GDDM Version 2, Release 1. The 3118 with Automatic Document Feed attached to an IBM Personal Computer and an IBM Personal System/2 will be supported by Image Support Facility 2, Version 1.1 licensed program.

**Publications:** The following publications are shipped with the product at no charge for the initial copy. Additional copy is available for a fee.

- GA18-2475 "Guide to Operations for IBM 3118 Scanner"
- GA18-2476 "Guide to Operations for the High-Speed Adapter" (includes the 5.25-inch diagnostic diskette)
- BK2T-0955 "Supplement to Guide to Operations for High-Speed Adapter (includes 3.5-inch diagnostic diskette)
- GK2T-0951 "Guide to Operations for the High-Speed Adapter/A (Includes 3.5-inch diagnostic diskette)

The GA18-2475 is shipped with the IBM 3118 Scanner, the GA18-2476 and GK2T-0955 are shipped with the High-Speed Adapter, and the GK2T0951 is shipped with the High-Speed Adapter/A.

The following languages for each publication are available:

"Guide to Operations for the IBM 3118 Scanner"

Language	Item Number	Order Number
English US	65X1814	GA18-2475
Canadian		

French	65X1816	GA09-0377
Japanese	65X1817	GA18-2475
Spanish	65X1815	GA10-0124

"Guide to Operations for the High-Speed Adapter"

Language	Item Number	Order Number
English US	6456788	GA18-2476
Canadian		
French	6456786	GA09-0378
Spanish	6456785	GA10-0125

"Supplement to Guide to Operations for the IBM High-Speed Adapter"

Language	Item Number	Order Number
English US	65X1870	GK2T-0955
Canadian		
French	6456786	GA09-0378
Spanish	65X2012	GY10-4009

"Guide to Operations for the IBM High-Speed Adapter/A"

Language	Item Number	Order Number
English US	65X1902	GK2T-0951
Spanish	65X1924	GK10-0003

The following publications are available for a fee:

- "Hardware Maintenance and Service", SY18-2158.
- "Hardware Maintenance and Service for the High-Speed Adapter (includes 5.25-inch diagnostic diskette), SY18-2167.
- "Supplement to Hardware Maintenance and Service for the High-Speed Adapter" (Includes 3.5-inch diagnostic diskette), GK2T-0955.
- "Hardware Maintenance and Service for the High-Speed Adapter/A" (includes 3.5-inch diagnostic diskette), SK2T-0953.
- "Technical Reference for the IBM 3118 Scanner", SC18-2104.
- "Technical Reference for the High-Speed Adapter", SC18-2117.
- "Technical Reference for the High-Speed Adapter/A", SC18-2155.

SLSS is available for order number and by product number.

"Hardware Maintenance and Service for the IBM 3118 Scanner".

Language	Item Number	Order Number
English US	65X1818	SY18-2181

"Hardware Maintenance and Service for the High-Speed Adapter".

Language	Item Number	Order Number
English US	6455787	SY18-2167
French	6455788	SY11-1017

"Supplement to Hardware Maintenance and Service for the High-Speed Adapter".

Language	Item Number	Order Number
English US	65X1870	GK2T-0955
French	65X2005	SY11-1035

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"Maintenance and Service for the High-Speed Adapter/A".

Language	Item Number	Order Number
English US	65X0824	SK2T-0953
French	94X2376	SY11-1030

"Technical Reference for the IBM 3118 Scanner".

Language	Item Number	Order Number
English US	65X1821	SC18-2014

"Technical Reference for the High-Speed Adapter"

Language	Item Number	Order Number
English US	6455771	SC18-2117

"Technical Reference for the High-Speed Adapter/A"

Language	Item Number	Order Number
English US	65X0825	SC18-2155

**Note:** Technical References are only available in US English.

The following Technical News Letter will be available from Mechanicsburg. The TNL contains important information on GDDM support of the Automatic Document Feed.

- GN18-2387 - Technical News Letter to IBM 3193 Display Station Description (GA18-2364)

**Shipping Manuals:** The "Guide to Operations for the IBM 3118 Scanner" is shipped with the 3118 Scanner. Specify one:

Language	Spec. Code	Item Number	Country
Canadian			
French	#2752	65X1816	Canada
English			
US	#2722	65X1814	All countries
Japanese	#2747	65X1817	Japan
Spanish	#2749	65X1815	Argentina

Additional copies of the "Guide to Operations for the IBM 3118 Scanner" and other publications will be available for a fee.

**SPECIFY**

Unless indicated otherwise, these specify features are available only at time of manufacture.

- Power - Model 010, no ADF, (120V AC, 1-phase, 50/60 Hz), 3-prong grounded plug; no specify required.
- Power - Model 011, no ADF, (200-240V AC, 1-phase, 50/60 Hz): no specify required.
- Power - Model 020, includes ADF, (120V AC, 1-phase, 50/60 Hz), 3-prong grounded plug; no specify required.
- Power - Model 021, includes ADF, (200-240V AC, 1-phase, 50/60 Hz): no specify required.
- Power Cord: 2.8m (9 ft) or 1.8m (6 ft) with nonlocking plug. Specify one:
  - #1017, P/N 6952323, 2.8m (200-240V), Indonesia

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## MACHINES

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- #1019, P/N 6952359, 2.8m (200-240V), Hong Kong, Malaysia, Singapore
- #1025, P/N 1838578, 2.8m (200-240V), Thailand, Peru
- #1026, P/N 6952377, 2.8m (200-240V), Chile
- #1027, P/N 6952294, 2.8m (200-240V), Argentina
- #2721, P/N 6952314, 2.8m (200-240V), Australia, New Zealand

- Power for the Automatic Document Feed is supplied from the 3118 Scanner.

SPECIAL FEATURES (NONE)

MODEL CONVERSIONS (NONE)

ACCESSORIES (NONE)

SUPPLIES (NONE)

## 3125 PROCESSING UNIT

(NO LONGER AVAILABLE)

The 3125 is No Longer Available -- MES orders for model changes, features, released RPQs and accessories are not affected. No new RPQs will be accepted.

### PURPOSE

Provides main and control storage, plus arithmetic and logic circuits for a S/370 mdl 125.

### MODELS

The 3125-0 and 3125-2 Processing Units are available in the following model groups:

				Processor
				Storage Size
3125-0		3125-2		
FE	FE0	FE2	FE2	98,304 bytes
G	G00	G2	G02	131,072 bytes
GE	GE0	GE2	GE2	163,840 bytes
GF	GF0	GF2	GF2	196,608 bytes
H	H00	H2	H02	262,144 bytes
		HG2	HG2	393,216 bytes *
		I2	I02	524,288 bytes *

\* If 3411 Magnetic Tape and Control is attached see Magnetic Tape Adapter special feature paragraph for RPQ requirement.

### HIGHLIGHTS

98,304 bytes up to 524,288 bytes of processor storage are available. The basic main memory cycle time is 480 nanoseconds for two bytes. 16 general purpose, 16 control, and four floating point registers are provided. The system design provides distributed micro-coded sub-processors for the independent handling of programs -- Instruction Processing Unit (IPU), Input/Output Processing (IOPs), and Diagnostic/Maintenance (SVP).

Direct attachment of the 3333/3330 DASD Subsystem or the 3340 DASD Subsystem or the 3340/3344 DAS Subsystem (3125-2 only) is provided. Depending on model and features up to 16 spindles can be attached. In a 3340 Subsystem the 3340 mdl A2 and its attached 3340 drives can be shared with another S/370, except 3115-0 or 3125-0, via the String Switch capability (#9315).

The 2311/3330 Series, the 2311-1/3340 Series and the 2314/3340 Series Compatibility features are available as options. They are mutually exclusive. Emulation is under DOS and DOS/VS only. 2311 mdl 1 emulation under DOS/VS requires SYSRES on 3340 or on 3330.

Capability to attach the 3803/3420 or 3411/3410 Magnetic Tape Subsystem mdls 1, 2, or 3 via the Magnetic Tape Adapter.

Capability to natively attach the following card I/Os through appropriate Integrated Card I/O Attachments: 2560 mdl A1; 3504 mdls A1, A2; 3525 mdls P1, P2, P3; and the 5425 mdls A1, A2 (96-column card).

Capability to natively attach the 5213 mdl 1 Console Printer (85 cps) is provided with the Integrated 5213 Printer Mdl 1 Attachment. This console slave printer provides hard copy output of operator messages presented on the Video/Display (CRT) Console. The 1052 compatibility feature is also available.

Capability to natively attach up to six synchronous and up to 16 asynchronous lines is provided by the Integrated Communications Adapter with appropriate features.

Capability to natively attach the 1403 Printer (mdl 2 or 7 or N1) is provided with the Integrated Printer Attachment.

Capability to natively attach the 3203 Printer is provided with the Integrated 3203 Printer Attachment.

The 1403/3203 Carriage Control Feature provides the capability to load information contained in the 1403 Carriage Control Tape into the 3203 Forms Control Buffer.

S/360 Model 20 Compatibility and 1401/1440/1460 Compatibility Features are provided to allow execution of the instructions of those systems.

The Operator Console is an integral part of the 3125. The standard online Video/Display-Keybaord enhances operator (human factor) machine communications. Data can be manually entered into the processor's main storage or into internal registers via the keybaord. Contents of storage or internal registers of the 3125 can be displayed on the Video/Display screen. The Video/Display with 16 lines of 56 characters/line and keybaord are designed for use as an operator console. A portion of the screen is reserved to display machine status. The Service Processor (SVP) continuously monitors system operation and logs errors on the magnetic diskette device. The SVP initiates recovery on detection of error conditions and provides control for the display, keybaord, magnetic diskette and optional console printer.

The standard console file is the basic microprogram loading device for the system. The console file contains a small read/write file device that provides the microcode for the system on removable magnetic IBM Diskettes. The diskettes that will be supplied with the system will contain the required microcode for the basic system, the optional features ordered for the system, and CE diagnostics.

The CE logout of machine and I/O related control checks and errors is recorded on the console file diskette for CE diagnosis, to enhance the reliability, availability, and serviceability of the mdl 125.

Extended Control (EC) Mode expands the structure of the Program Status Word to accommodate the control of S/370 features and extends the number of permanently assigned main storage locations. The mdl 125 can operate in either EC Mode or Basic Control (BC) Mode as defined for the S/360.

Dynamic Address Translation (DAT) is a standard facility on the mdl 125. When the mdl 125 is in Extended Control (EC) Mode with Translation Mode operable, programs are not required to be completely resident in main memory for execution. Under Supervisor control, portions of programs ("pages") may be stored on a direct access device until needed, at which time they are returned to main storage and may be relocated to any available location. Program addresses are treated as "logical addresses" and the translation feature develops "real addresses". Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the mdl 125.

Program Event Recording (PER), a standard feature, is a debugging aid which permits four types of events to be selectively monitored: (1) successful branches, (2) instruction fetch address compare, (3) main storage alteration address compare, (4) general register alteration address compare.

Standard features include a S/370 commercial instruction set, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording, Monitor Call, interval timer, time-of-day clock, CPU Timer and Clock Comparator, store and fetch protect, byte-oriented operand feature, error checking and correction in main storage, automatic instruction retry, and Audible Alarm.

**Control Storage:** Reloadable control storage for the Service Processor (SVP), direct DASD attachment, and Instruction Processing Unit (IPU) are provided as standard on the 3125 Processing Unit. In addition reloadable control storage is available for the optional

Card I/O Attachment, Printer Attachment, Integrated Communications Adapter (ICA), Byte Multiplexer Channel, and Console Printer Attachment. Control storage is loaded from the diskette housed in the Service Console Unit.

The IPU of the 3125-0 contains as standard 12K words of control storage. Certain features/combinations require up to two 4K word increments in addition. See Chart A for details.

The IPU of the 3125-2 contains as standard 16K words of control storage. One 8K word increment may be ordered as an optional feature for use with certain feature combinations. See Chart A for details.

**CHART A:** Listed below are the valid feature combinations and their respective requirements for additional control storage.

*														
Model	Basic Control							#4105 Req'd						
3125-2	Storage													
-----														
Model	Ba.	#4101						#4101 and						
3125-0	Ctl	Stg Required						#4102 Req'd						
-----														
#4457 *	x		x*	*					x*	x		x	x*	x
#7520 *	x	x	*	*		x	x	x	*		x	x	*	
#3910		x	x	x		x	x	x			x	x	x	x
#8040**				x		x			x		x	x	x	
#8060**					x		x			x	x		x	
#8070**					x			x		x		x		x

\* 1401/1440/1460 Compatibility (#4457) and S/360 Mdl 20 Compatibility (#7520) are mutually exclusive (may not be ordered on the same system unless RPQ SU0002 is installed on the 3125. ) Cannot be installed with 3344 Attachment (#9317). Note: RPQ SU0002 cannot be installed if the 2311 Mdl 1/3340-Series Compatibility (#8060) or 2314/3340-Series Compatibility (#8070) is installed.

\*\* #8040 and #8060 and #8070 are mutually exclusive. In addition, #8060 and #8070 are mutually exclusive with specify feature #9190 or 3334 Attachment specify feature (#9317). #9190 does not require additional control storage.

Note: Specify feature #9315 is mutually exclusive with #4105 and/or #4460.

**Input/Output Attachment - Native:** The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices. They are designed to interact with their respective I/O devices and should be installed/removed with them since the system is inoperative with only the attachment/adaptor installed.

- Direct Disk Attachment (standard): Attaches either the 3340 mdl A2 or the 3333 mdl 1 dual disk drive and control unit directly to the 3125. The attachment supports block multiplexing. Channel address is 1, physical spindle addresses are 160 to 167 on the first string and 168 to 16F on the second string. For logical address assignment for 3344 refer to the "Functional Characteristics Manual", GA33-1506.
- 3333/3330 DASD Subsystem: One 3333 mdl 1 and one additional 3330 mdl 1 or 2 can be attached to provide up to four spindles.
- 3340 DASD Subsystem: On the 3125-0 one 3340 mdl A2 and up to three 3340 mdls B1/B2 can be attached to provide up to eight spindles. On the 3125-2 (with 16-Drive Expansion #9315) one or two 3340 mdls A2 can be directly attached with up to three 3340 mdls B1/B2 attached to each of the 3340 mdl A2 to provide up to 16 spindles on the system.

- 3340/3344 DAS Subsystem: On the 3125-2 with 3344 Attachment #9317 installed: One 3340 mdl A2 and any combination of up to three 3340 mdls B1/B2 and 3344 mdl B2/B2F can be attached on the first string. In addition, on the 3125-2, one 3340 mdl A2 and up to three 3340 mdls B1/B2 can be attached on the second string to provide up to 16 physical or the equivalent of up to 34 logical spindles on the system.

- Magnetic Tape Adapter (optional): This feature attaches one of the following tape control units and is addressed as channel 2:

- 3411-1 Tape Control (data rate 20Kb) housing one tape drive. Up to three additional 3410-1 Magnetic Tape Drives may be attached to the 3411-1 Control Unit.
- 3411-2 Tape Control (data rate 40Kb) housing one tape drive. Up to five additional 3410-2 Magnetic Tape Drives may be attached to the 3411-2 Control Unit.
- 3411-3 Tape Control (data rate 80Kb) housing one tape drive. Up to five additional 3410-3 Magnetic Tape Drives may be attached to the 3411-3 Control Unit.
- 3803-3 Tape Control. Up to eight 3420 Tape Units Mdl 3 or 5 may be attached to the 3803.

- Integrated Card I/O Attachments (optional): These features provide native attachment of one of the following:

3504 Card Reader mdls A1 or A2  
3525 Card Punch mdl P1, P2, or P3  
2560 Multifunction Card Machine mdl A1  
5425 Multifunction Card Unit mdls A1 or A2  
3504 Card Reader and 3525 Card Punch  
3504 Card Reader and 2560 MFCM  
3504 Card Reader and 5425 MFCU

The Integrated Card I/O Attachment uses channel 0. Device address X'00C' is reserved for the 3504 reader and device address X'00D' is reserved for the 2560, 5425, or 3525.

- Integrated Printer Attachment (optional): Attachment features for the 1403 Printer mdls 2, 7, and N1 and for the 3203 Printer mdl 1 or 2 are available. Only one printer unit can be natively attached. The printer adapter is addressed as channel 0 and the device address is X'00E'. The Universal Character Set feature can be optionally selected for the 1403-2 or N1 on the 3125 at no charge.

- Integrated Console Printer Attachment (optional): Attaches the 5213 mdl 1 Printer to the 3125 to provide hard copy of operator messages presented on the standard Display Operator Console. It uses address X'01F' (same as the Display Operator Console) on channel 0. When the 1052 Compatibility feature is installed, 5213 mdl 1 Printer is required.

- Integrated Communications Adapter (ICA) (optional): Provides the basic control storage and common circuits for direct attachment of up to six synchronous (BSC) communication lines or up to 16 asynchronous (start/stop) lines. The Integrated Communications Adapter Extension (ICAE) #4641 adds the capability to attach up to six BSC and up to 16 start/stop lines. IBM line adapters are provided within the mdl 125.

#### Input/Output Channel:

- Byte Multiplexer Channel (optional): A wide variety of I/O devices may be attached to the S/370 mdl 125 via the optional byte multiplexer channel. One channel is available on the 3125 as a special feature and is functionally equivalent to the byte multiplexer channel on S/360 mdls 22, 25, 30, and 40. 32 subchannels are provided as standard. (Eight channels may be shared and 24 are unshared). The byte multiplexer channel provides eight control unit positions and permits I/O units to operate normally in byte mode, giving the effect of several I/O operations simultaneous with computing. In burst mode, the channel handles one high-speed unit with a maximum data rate of 29Kb per second. It is capable of sustained data rates up to 25Kb per second in byte mode. It is addressed as

channel 0. For OS/360 exclusions, refer to "System/360 Operating System Generation", (GC28-6554).

**Console Function:** System control functions are provided by the standard integrated Video/Display-Keyboard. It has the switches and lights necessary to operate and control the system. Optionally, the 5213-1 Console Printer 85 cps) may be attached via feature number #4692. The optional 1052 compatibility (#8005) operates the 5213-1 printer and standard systems keyboard as an operator console in S/360-1052 mode only. In this mode of operation, the Video/Display-Keyboard acts as a slave unit to the printer.

**Publications:** GC20-0001

## SPECIFY

- Power (AC, 3-phase 4-wire):
 

50 Hz	200V	#2807	60 Hz	200V	#2733
	220V	#2815		208V	#9903
	235V	#2818		230V	#9905
	380V	#2816			
	408V	#2819			
- Line Cord for Japan, 50 Hz: #2747.
- Color Group: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Cabling: #9080 for below the floor, or #9081 for on the floor.
- CPU Configuration: #9091 for Configuration 1 (CPU located behind console table), or #9092 for Configuration 2 (CPU bolted to right side of console table). Configuration 2 excludes a 5425 MFCU from being natively attached. See "S/370 Installation Manual for details.
- Minimum Configuration: In addition to the 3125 Processing Unit, each S/370 mdl 125 requires a 2-spindle direct access storage device, line printer, and card reader. To run back level DOS Version 3 (Releases 21 - 26) and DOS Version 4, a 5213 mdl 1 Console Printer and the 1052 Compatibility feature must be installed. To run DOS Version 3, the 2311 mdl 1 Compatibility feature is also required.
- Video Display/Keyboard Console Language Combination: See chart at end of M3125 pages for "Specify" code.
- DASD Attachment: Specify one - #9313\* for 3330 Attachment or #9314\* for 3340/3344 Attachment (3125-2 only). Specify Fixed Head Attachment (#9190)\* if Fixed Head Feature is installed on the 3340 Series drives. Note: The Fixed Head Attachment Feature (#9190) cannot be installed with 2311 Mdl 1/3340-Series Compatibility (#8060) or 2314/3340-Series Compatibility (#8070).
- Specify String Switch Capability/16-Drive Expansion (#9315)\* (3125-2 only) if String Switch (#8150) is installed on one or both 3340 mdl A2s, or if a second 3340 mdl A2 is installed no matter how many drives there are (16-Drive Expansion). Specify #9306 Second String if two 3340 mdl A2s are installed. #9315 requires 4K DASF Control Storage Extension (#4210). #9315 cannot be installed with #4105 or #4460, and is mutually exclusive with 3344 Attachment #9317\*.

When String Switch is installed, an Emergency Power Off connection between the sharing systems is mandatory. RPQ DC3621 (two system connection) or DC3622 (multiple system connection) must be ordered.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

The 3125-2 uses fixed addresses 160 to 16F for its attached disk drives. In the case of string switch, to avoid confusion in

Job Control and Operation, the same addresses should be assigned to shared drives on the other system. In the case of the 3135, 3135-3, 3138 IFA, this requires specify code #9821 on the 3135 providing addresses 160 through 16F to comply with the fixed addresses of the 3125. If intermixing 3330 and 3340 on the 3135, 3135-3, 3138 (#9315), no string switching with the 3125-2 is possible.

**Note:** The string switch of the DASD hardware function can be operated with the present DOS/VS standard DASD support. DOS/VS does not support the device reserve/release channel commands for program-controlled sharing of attached DASD units. Therefore, it is the user's responsibility by appropriate organization and programming procedures to resolve conflicting references to shared files and ensure data integrity. One method for controlling potential conflicts involves the use of operator commands DVC UP/DVC DN. For additional information, consult "DOS/VS System Management Guide", GC33-5371.

- On the 3125-2 -- specify 3344 Attachment (#9317)\* when 3344 mdl B2/B2Fs are installed. 4K DASF Control Storage Extension is required. Cannot be installed with any of the following: String Switch Capability (#9315), 231X/3340 Compatibility (#8060/#8070), S/360 Mdl 20 Compatibility (#7520) -- 1401/1440/1460 Compatibility (#4457) -- 1403/3203 Carriage Control Feature (#4460). Specify #9306, Second String, if two 3340 mdl A2s are installed.

## SPECIAL FEATURES

### NON-COMMUNICATIONS FEATURES

**External Signals (#3898):** Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. Maximum: One per 3125. Cable Order: Required. Field Installation: Yes. Prerequisites: External devices must meet the interface specifications outlined in "S/360 Direct Control Feature - OEMI", GA22-6845.

**Floating Point Including Extended Precision (#3910):** Adds 51 floating point arithmetic instructions. Provides for floating point operation including extended precision to 28 hexadecimal digits. Field Installation: Yes. Limitations: Cannot be installed with Floating Point (#3900). Prerequisites: See Charts A/B above for control storage requirements.

**4K Control Storage Increment (#4101, #4102):** (Mdl 0) Each adds 4,096 words (22 bits wide) of control storage. Required for certain feature combinations -- See "Control Storage Requirements" under "Highlights" for details. #4101 for first 4K increment -- #4102 for second 4K increment. Field Installation: Yes. Prerequisites: #4102 requires #4101.

**8K Control Storage Extension (#4105):** (Mdl 2) Adds 8,192 words (22 bits wide) of control storage to the IPU. Required for some combinations -- see Chart A. Limitations: Cannot be installed with #4210 or #9315. Field Installation: Yes. Maximum: One.

**4K DASF Control Storage Extension (#4210):** (Mdl 2) Adds 4,096 words (22 bits wide) to the DDA control storage for use with either or both the String Switch Capability or 16 Drive Expansion specify feature (#9315) or 3344 Attachment specify feature (#9317). Limitations: Cannot be installed with 4105 or #4460. Maximum: One. Field Installation: Yes.

**1401/1440/1460 Compatibility (#4457):** Microprogram controlled feature which, in combination with an emulator program under DOS/VS, permits the system to execute 1401/1440/1460 instructions. Field Installation: Yes. Prerequisites: See "Control Storage Requirements" under "Highlights" above. Limitations: Cannot be installed with 3344 Attachment (#9317) or with S/360 Mdl 20 Compatibility (#7520) unless RPQ SU0002 is installed on the 3125 -- RPQ SU0002 cannot be installed if the 2311 Mdl 1/3340 or 2314/3340 Compatibility feature (#8060, #8070) is installed.

**1403/3203 Carriage Control Feature (#4460):** Allows the 3203 Printer with its tapeless carriage control to emulate the function of a tape controlled carriage and thus run programs written for a 1403 Printer. Limitations: The 5203 Printer is not supported by this feature. Cannot be installed with string switch capability (#9315) or 3344 Attachment specify feature (#9317). Field Installation: Yes. Prerequisites: 3203 Printer. Note: This feature is not required with DOS/VS Release 31 and subsequent releases.

**5425 Multifunction Card Unit Power Prerequisite (#4500):** Provides the power supply for the 5425 Multifunction Card Unit when no native printer 1403 or 3203 is attached. Limitations: Cannot be installed with 1403 Printer/5425 Card Unit Power Prerequisite (#4505). Maximum: One. Field Installation: Yes.

**1403 Printer/5425 Card Unit Power Prerequisite (#4505):** Provides the power supply for the natively attached 1403 Printer with or without a 5425 MFCU. Limitations: Cannot be installed with 5425 Multifunction Card Unit Power Prerequisite (#4500). Maximum: One. Field Installation: Yes.

**Integrated 3203 Printer Attachment (#4650):** Control for attaching the 3203 Printer mdl 1 or 2. Limitations: Cannot be installed with Integrated 1403 Printer Attachment (#4662, #4667 or #4668). Maximum: One. Field Installation: Yes.

**Integrated 1403 Printer Mdl 2 Attachment (#4662):** Provides control for attaching the 1403 Printer mdl 2. Specify: #9847\* to support UCS (#8641) on the 1403 mdl 2. Limitations: Cannot be installed with Integrated 3203 Printer Attachment (#4650). Maximum: One. Field Installation: Yes. Prerequisites: #4667 and #4505.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Integrated 1403 Printer Attachment (#4667):** Control for attaching the 403 Printer mdl 7. Prerequisite feature required for installation of the Integrated 1403 Printer Mdl 2 or Mdl N1 Attachment (#4662, #4668). Limitations: Cannot be installed with Integrated 3203 Printer Attachment (#4650). Maximum: One. Field Installation: Yes. Prerequisites: #4505.

**Integrated 1403 Printer Mdl N1 Attachment (#4668):** Control for attaching the 1403 Printer mdl N1. Specify: #9847\* to support UCS (#8640) on the 1403 mdl N1. Limitations: Cannot be installed with Integrated 3203 Printer Attachment (#4650). Maximum: One. Field Installation: Yes. Prerequisites: #4662, #4667, #4505.

**Integrated 2560 Attachment (#4670):** Control for the 2560 Multifunction Card Machine mdl A1. Limitations: Cannot be installed with Integrated 3525 Card Punch Attachment (#4685) or with Integrated 5425 Attachment (#4695). Maximum: One. Field Installation: Yes. Prerequisites: #9726 is required on the 2560 mdl A1.

**2560 Card Print Control (#4674):** Provides control for Card Print capability on the 2560 Multifunction Card Machine mdl A1. Specify: #9797\* for first two print lines, #9798\* for second two, #9799\* for third two, when corresponding Card Print features (#1575, #1576, #1577) are installed on the 560 mdl A1. Field Installation: Yes. Prerequisites: #4670 on the 3125.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

#### 2560 Print Languages:

English US	#2956*
Japanese	#2968*
Katakana	#2973*
Spanish	#2961*

**Magnetic Tape Adapter (#4675):** Provides control for attachment of one 411 Magnetic Tape Unit and Control mdl 1, 2 or 3 or one 3803 Tape Control mdl 3. See M3420 and 3803 or 3411 and 3410 pages for additional ordering instructions. The Magnetic Tape Adapter is ad-

ressed as Channel 2. Maximum: One. Specify #9807 for attachment of 3803 mdl 3. See "Highlights" for additional information. Field Installation: Yes. Limitations: A 3803 and 3411 cannot coexist on the Magnetic Tape Adapter. Prerequisites: #7361 on the 3411, except for 3125 mdl HG2. When attached to 3125 mdl HG2, RPQ 870061 is required on the 3411.

**Integrated 3504 Card Reader Attachment (#4680):** Control for attaching the 504 Card Reader mdl A1 or A2. Supports Read Column Eliminate capability on the 3504 Card Reader. Specify: #9781 for 3504 mdl A1, or #9782 for 3504 mdl A2; #9783 provides Optical Mark Read capability on the 3125 when Optical Mark Read (#5450) is installed on the 3504 mdl A1 or A2; #9784 provides the capability of using the Selective Stacker (#6555) feature on the 3504 mdl A1 or A2. Maximum: One. Field Installation: Yes.

**Integrated 3525 Card Punch Attachment (#4685):** Control for attaching the 3525 Card Punch mdl P1, P2 or P3. Specify: #9791\* for 3525 mdl P1, #9792\* or 3525 mdl P2, or #9793S for 3525 mdl P3. Specify #9794\* when the Card Read (#1533) feature is installed on the 3525. Limitations: Cannot be installed with Integrated 2560 Mdl A1 Attachment (#4670) or Integrated 5425 Attachment (#4695). Maximum: One. Field Installation: Yes.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Integrated 5213 Printer Mdl 1 Attachment (#4692):** Attaches the 5213 Printer mdl 1. Includes a special cable to support the printer. Maximum: One. Field Installation: Yes.

**3525 Card Print Control (#4693):** Provides control for Card Print (#8339, #5273) capability on the 3525 Card Punch. Specify: #9795\* when Two-line Card Print (#8339) is installed on the 3525, or #9796\* when Multiline Card Print (#5273) is installed on the 3525. (Japan only> Note: Specify 2973 for Katakana (if desired) in addition to #9795 or #9796.<) Field Installation: Yes. Prerequisites: Integrated 3525 Card Punch Attachment (#4685).

**Integrated 5425 Attachment (#4695):** Control for attaching the 5425 Multifunction Card Unit mdl A1 or A2. Specify: #9183\* for mdl A1, or #9184\* for mdl A2. Limitations: Cannot be installed with Integrated 3525 Card Punch Attachment (#4685) or with Integrated 2560 Mdl A1 Attachment (#4670). Can only be installed with CPU Configuration 1 (#9091). See "Specify" above. Maximum: One. Field Installation: Yes. Prerequisites: 1403 Printer/5425 Card Unit Power Prerequisite (#4505) required when 1403 is natively attached, or 5425 Multifunction Card Unit Power Prerequisite (#4500) if no native printer (1403 or 3203) is configured. When 3203 Printer is attached, #4500 or #4505 is not required.

**Basic Byte Multiplexer Channel (#5248):** To attach low speed byte Multiplex devices -- see "Byte Multiplexer Channel" under "Input/Output Channel". Feature includes control storage necessary for IOP operation. Maximum: One. Field Installation: Yes.

**S/360 Mdl 20 Compatibility (#7520):** Microprogram controlled feature which, in combination with special software, permits the system to execute S/360 mdl 20 instructions. Field Installation: Yes. Limitations: Cannot be installed with 3344 Attachment (#9317) or with 1401/1440/1460 Compatibility (#4457) unless RPQ SU0002 is installed on the 3125 -- RPQ SU0002 cannot be installed if either 2311 Mdl 1/3340 or 2314/3340 compatibility feature (#8060, #8070) is installed. Also note control storage requirements in Chart A. Prerequisites: See "Control Storage Requirements" under Highlights" above.

**1052 Compatibility (#8005):** Operates the 5213 Printer mdl 1 and standard keyboard as an operator console in S/360 1052 mode only. In this emulation mode of operation the Video/Display acts as a slave unit to the printer. Field Installation: Yes. Prerequisites: #4692 and the 5213 Printer mdl 1.

**2311 Mdl 1/3330 - Series Compatibility (#8040):** Permits the emulation of 2311 mdl 1 files on the 3333/3330 Disk Storage. The user program may access both the emulated 2311 mdl 1 data set as well as the native data set. This provides a "mixed-mode" operating en-

vironment. Prerequisites: Minimum of one 4K Increment of Control Storage (#4101, #4102). See "Control Storage Requirements" under "Highlights" above. Note: When running DOS Release 21-27, 1052 Compatibility (#8005) is a prerequisite. The 1403/3203 Carriage Control Feature (#4460) is also required if a 3203 Printer is attached. Emulation under DOS/VS requires SYRES on 3330 in native mode. Field Installation: Yes. Limitations: #8040, #8060 and #8070 are mutually exclusive.

**2311 Mdl 1/3340 - Series Compatibility (#8060):** Permits the emulation of 2311 mdl 1 files on the 3340 disk storage. The user program may access both the emulated 2311 mdl 1 data as well as the native data set. This provides a "mixed mode" operating environment. Limitations: #8060 cannot be installed with #9317. #8040, #8060, #8070 and #9190 are mutually exclusive. Field Installation: Yes. Prerequisites: Minimum of one 4K Increment of Control Storage (#4101, #4102). See "Control Storage Requirements" under "Highlights" above. Note: When running DOS Release 21 through 27, 1052 Compatibility (#8005) is a prerequisite. The 1403/3203 Carriage Control Feature (#4460) is also required if a 3203 Printer is attached. Emulation under DOS/VS requires SYRES on the 3340 DASD.

**2314/3340 - Series Compatibility (#8070):** Permits the emulation of 2314 files on the 3340 disk storage. The user program may access both the emulated 2314 data set as well as the native data set. This provides a mixed mode" operating environment. Limitations: #8070 cannot be installed with 3344 Attachment (#9317). #8040, #8060, #8070 and #9190 are mutually exclusive. Field Installation: Yes. Prerequisites: Minimum of one 4K Increment of Control Storage (#4101, #4102). See "Control Storage Requirements" under "Highlights" above. Note: When running DOS Release 21 through 27, 1052 Compatibility (#8005) is a prerequisite. The 1403/3203 Carriage Control Feature (#4460) is also required if a 3203 Printer is attached. Emulation under DOS/VS requires SYRES on the 3340 DASD in native mode.

## COMMUNICATIONS FEATURES

**Asynchronous Line Group 1 (ALG1) (#1201):** Permits attachment of up to four Medium Speed Asynchronous Lines (AL) (#1231) or up to four Low Speed Asynchronous Lines Pairs (ALP) (#1241) or up to four Telegraph Line Pairs (TLP) (#7881). The lines within the ALG positions A1 through A4, must be installed in ascending order. Specify: One line control specify code from Figure 2A. Limitations: All lines in the ALG1 must have the same line speed and line control. Different terminals can be attached within one line group, provided they use the same speed and line control. See Figure 2A. ALG1 (#1201) and SLHS (#7121) are mutually exclusive. Maximum: One. Field Installation: Yes. Prerequisites: #4640.

**Asynchronous Line Group 2 (ALG2) (#1202):** Permits attachment of up to four medium speed asynchronous lines (AL) (#1232) or up to four low speed asynchronous line pairs (ALP) (#1242) or up to four telegraph line pairs (TLP) (#7882). ALG1 and ALG2 are identical in function and either one can be installed as the first line group in the ICA. The lines within ALG2, positions A5 through A8, must be installed in ascending order. Limitations: All lines in ALG2 must have the same line speed and line control. Different terminals using the same line speed and line control can be attached within one line group. See Figure 2A. Specify: One line control specify code from Figure 2A. Maximum: One. Field Installation: Yes. Prerequisites: #4640.

**Asynchronous Line, Medium Speed (AL) (#1231 in ALG1, #1232 in ALG2):** Provides for the attachment of one nonswitched 600 bps Start/Stop communications line. The 3767 terminal can be attached to this feature (at EC 380427 plus EC 380627) via switched or non-switched lines at 200 or 300 bps and via nonswitched lines at 600 bps. Clocking speed is selected at installation time. Connects to the line via a modem or IBM Line Adapter. The lines are installed in ascending order, A1 through A4 in ALG1 and A5 through A8 in ALG2. Note: IBM Line Adapters are tied to specific line positions. See Figure 4D. Limitations: See Figure 5, Maximum ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG1. #1232, #1242 and #7882 cannot be intermixed within ALG2. Maximum: Four each of #1231 and #1232. Field Installation: Yes. Prerequisites: #1201.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Asynchronous Line Pair, Low Speed (ALP) (#1241 in ALG1, #1242 in ALG2):** Provides for the attachment of two switched or nonswitched 134.5 bps Start/Stop communications lines. Connects to the line via a modem, nonswitched also via IBM line adapters or external telegraph line adapters. Consult your TP Coordinator for RPQ order information when telegraph lines are used or, two nonswitched double-current telegraph lines at 50, 75 or 100 bps via external telegraph line adapters. Consult your TP Coordinator or RPQ order information. The lines are installed in ascending order, A1 through A4 in ALG1 and A5 through A8 in ALG2. Note: IBM Line Adapter are tied to specific line positions. See Figure 4D. Limitations: See Figure 5, Maximum ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG1. #1232, #1242 and #7882 cannot be intermixed within ALG2. Maximum: Four. Field Installation: Yes. Prerequisites: #1201 is prerequisite to #1231. #1202 is prerequisite to #1232.

**Integrated Communications Adapter (ICA) (#4640):** Provides the basic control storage and common circuits for direct attachment of up to six synchronous (BSC) communication lines or up to 16 asynchronous (Start/Stop) communication lines depending upon line speed. All combinations of BSC and Start/Stop lines require the Integrated Communications Adapter Extension (#4641). Additional features are required to create appropriate line interfaces for the individual lines. Figure 1A schematically represents the feature build-up. Figure 1A shows the feature build-up for asynchronous lines or for combinations of asynchronous and synchronous lines. The ICA provides as a standard:

- Autopoll -- Start/Stop and BSC
- Multipoint central station functions -- Start/Stop and BSC
- Multipoint tributary station functions -- BSC only
- EBCDIC transparent mode -- BSC only
- EBCDIC or ASCII code -- BSC only

Refer to Figures 2A and 2B for attachable terminals and for configuration requirements prior to ordering features below.

**Note:** An APL Configurator is available from IBM in configuring the ICA (or refer to "ICA Configurator Manual", GA33-1508, using ICA Specification Sheet, Z811-0023). Customer Responsibilities: See M2700 pages for customer responsibilities regarding communications facilities and services. Communications Facilities: See M2700 pages for communications facility requirements with this feature. Maximum: One. Field Installation: Yes.

**Integrated Communications Adapter Extension (ICAE) (#4641):** This feature is required for all combinations of BSC and Start/Stop lines. Extends the communications capability to up to six BSC and up to 16 Start/Stop lines depending upon line speed. Maximum: One. Field Installation: Yes. Prerequisites: #4640.

**IBM Leased Line Adapter (#4743):** A modem for Start/Stop data transmission at 134.5 or 600 bps over nonswitched facilities. This line adapter operates with Leased Line Adapters on other IBM products. Selection between 2- and 4-wire operation is made at installation time. See "Leased Line Adapter" in GA24-3435 for specifications and restrictions. Specify: See Figure 4D. Maximum: See Figure 4D. Field Installation: Yes. Prerequisites: #4792 or #4793. See Figure 4D.

**IBM 1200 bps Line Adapter (#4781):** A modem for BSC data transmission at up to 1200 bps over nonswitched facilities. Also for Start/Stop transmission at 300 or 600 bps over nonswitched facilities to the 3767 terminal. Non-clocked and must interface to an SLC (#7141-#7144) or AL (#1231). Attachment is directly to the line via an IBM-provided external cable. Customer Responsibilities: See M2700 pages. Communications Facilities: See M2700 pages. Specify: See Figure 4D. In Japan only, specify code #2943 must be ordered for attachment to the NTT D-1 service. Maximum: See Figure 4D. Field Installation: Yes. Prerequisites: #7141 - #7144 or #1231, #4792 or #4793. See Figure 4D. #1295 or #1296 is required for #4791.

**Line Adapter Base 3 (LAB3) (#4793):** Provides attachment of up to 12 IBM 1200 bps Line Adapters and IBM Leased Line Adapters. The Line Adapters are tied up to specific line positions. See Figure 4D for configuration and possible line combinations. Maximum: One. Field Installation: Yes.

**Synchronous Line, Low-Load (SLLL) (#7131 - 1st Line, #7132 - 2nd Line):** Each provides for the attachment of one switched or non-switched BSC line. Nonswitched lines with switched network backup are supported. Maximum line speed on nonswitched lines is 7200 bps. Maximum line speed on switched network is 1200 bps. See Figure 2B for detailed speed and facility information. Requires external modem. This feature has a lower load factor than #7151 - #7154. See Figure 5. The modem must provide clocking. Specify: The highest line speed used on #7131 and #7132: #9758 if the highest line speed is from 1200 bps up to 4800 bps. #9759 if the highest line speed is above 4800 bps and up to 7200 bps. Note: 1200 bps is the LOWEST allowed line speed for these features. SLG (#7100) not required as a prerequisite. Limitations: See Figure 5, Maximum ICA configuration. #7121 and #7131 are mutually exclusive. Maximum: One each, #7131 and #7132. Field Installation: Yes. Prerequisites: ICA (#4640) - #7132 requires #7121 or #7131.

**Synchronous Line Medium-Speed Clock (SLC) (#7141-#7144):**

#7141 -- Line position S1  
#7142 -- Line position S2  
#7143 -- Line position S3  
#7144 -- Line Position S4

Line positions S1 through S4 must be installed in ascending order. Each feature provides for the attachment of one switched or non-switched BSC line. The clock can be set by the user for a transmission rate of 600 bps or 1200 bps. Connects to the line via a non-clocked modem or PTT mandatory modem. The IBM 1200 bps Line Adapter (#4781) can be used instead of a modem on non-switched lines. Notes: IBM Line Adapters are tied to specific line positions. See Figure 4D. SL (#7151-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. Limitations: See Figure 5, Maximum ICA Configuration. #7141 is mutually exclusive with #7151, #7142 with #7152, #7143 with #7153, and #7144 with #7154. Maximum: #7141 through #7144, one each. Field Installation: Yes. Prerequisites: #7100.

\* CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.

**Synchronous Line Medium-Speed (SL) (#7151-#7154):**

#7151 -- Line position S1  
#7152 -- Line position S2  
#7153 -- Line position S3  
#7154 -- Line position S4

Line positions S1 through S4 must be installed in ascending order. Each feature provides for the attachment of one switched or non-switched BSC line. Nonswitched lines with switched network backup are supported. Maximum line speed on nonswitched line is 7200 bps; maximum speed of switched network depends on current regulations of the national PTT. See Figure 2B for detailed speed and facility information. Connects to the line via an external IBM or PTT mandatory modem. The modem must provide clocking. Note: SL (#7141-#7154) may be intermixed with SLC (#7141-#7144) within the SLG. Limitations: See Figure 5, Maximum ICA Configuration. #7151 is mutually exclusive with #7141, #7152 with #7142, #7153 with #7143, and #7154 with #7144. Maximum: #7151 through #7154, one each. Field Installation: Yes. Prerequisites: #7100.

**Telegraph Line Pair (TLP) (#7881 in ALG1, #7882 in ALG2):** Provides for the attachment of two nonswitched single current telegraph lines at 50 or 75 bps. Attachment to the lines is via an IBM-provided external cable. Lines A1 through A4 in ALG1 and A5 through A8 in ALG2 are installed in ascending order. Limitations: See Figure 5, Maximum ICA Configuration. #1231, #1241 and #7881 cannot be intermixed within the ALG1. #1232, #1242 and #7882 cannot be intermixed within ALG2. Maximum: Four each. Field Installation:

Yes. Prerequisites: #1201 is prerequisite to #7881. #1202 is prerequisite to #7882.

**Modems:** The IBM modem can be attached to each external modem line interface maximum 22 modems).

Modem	Speed (bps)/Lines
3976 mdl 1	up to 200/nonswitched
3976 mdl 2	up to 200/switched
3976 mdl 3	up to 1200/nonswitched or switched
3977 mdl 2	up to 1200/nonswitched
3863 mdl 1/2	2400/nonswitched or switched
3872 mdl 1	2400/nonswitched or Caducee switched
3864 mdl 1/2	4800/nonswitched or switched
3874 mdl 1	4800/nonswitched
3875 mdl 1	7200/nonswitched

**Note:** For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, and 3872 pages.

Customer Responsibilities: See "Customer Responsibilities" in M2700 pages.

**FIGURE 1A INTEGRATED COMMUNICATIONS ADAPTER SCHEMATIC FEATURE BUILD-UP**

*-----*				Asy	Syn
ICAE	LINE	LINE INTERFACE	Asy	Syn	
#4641	GROUP		Pos	Pos	
ICA #4640	ALG1 #1201	AL (#1231), or ALP (#1241), or TLP (#7881)	A1		
		AL (#1231), or ALP (#1241), or TLP (#7881)	A2		
		AL (#1231), or ALP (#1241), or TLP (#7881)	A3 (1)		
		AL (#1231), or ALP (#1241), or TLP (#7881)	A4 (1)		
	ALG2 #1202	AL (#1232), or ALP (#1242), or TLP (#7882)	A5		
		AL (#1232), or ALP (#1242), or TLP (#7882)	A6 A6		
		AL (#1232), or ALP (#1242), or TLP (#7882)	A7 (1)		
		AL (#1232), or ALP (#1242), or TLP (#7882)	A8 (1)		
SLG1		SL (#7151), or SLC (#7141)			S1
		SL (#7152), or SLC (#7142)			S2

#7100	SL (#7153), or SLC (#7143)	S3 (1)
	SL (#7154), or SLC (#7144)	S4 (1)
	SLLL (#7131), or SLHS (#7121)	S5
	SLLL (#7132)	S6

1. Ignore this note.

FIGURE 2A START/STOP TERMINALS

1 of 2	Speed (bps)	ALG1		ALG	
		Line Inter-face	Line* Ctrl Spcf	Line Inter-face	Line* Ctrl Spcf
1030	600	#1231	#9740	#1232	#9750
1050	134.5	#1241	#9738	#1242	#9748
1060	134.5	#1241	#9738	#1242	#9748
2741	134.5	#1241	#9738	#1242	#9748
3750	134.5	#1241	#9738	#1242	#9749
3767-1, w #7113 /#7111	200/300	#1231	#9739	#1232	#9749
3767-1, 2, 3 w #7112	600	#1231	#9739	#1232	#9749
5010 mdl Axx	134.5	#1241	#9738	#1242	#9748
5010 mdl Axx	600	#1231	#9739	#1432	#9749
5100/5110	134.5	#1241	#9738	#1242	#9748
5100/5110	300	#1231	#9739	#1232	#9749
WT Tel Sgl Cur	50	#7881	#2832	#7882	#2834
WT Tel Sgl Cur	75	#7881	#2833	#7882	#2835
WT Tel Sgl Cur	50	#1241*	#2914	#1242	#2917
WT Tel Sgl Cur	75	#1241*	#2915	#1242	#2918
WT Tel Sgl Cur	100	#1241*	#2916	#1242	#2919

\* Contact your TP Coordinator for RPQ order information.

FIGURE 2B BINARY SYNCHRONOUS TERMINALS

SPEED (bps)	1 of 2		600/1200		1200		2400	
	LINE INTERFACE		#7141-4 or #7151-4	#7141-4 or #7151-4	#7141-4 or #7151-4	#7141-4 or #7151-4	#7151 thru #7154	
FACILITY	CA2	DA3	CA2	DA3	CA2	DA3	C3	D5
	C2	D3	C2	D3	C2	D3	C3	D5
1131 w #7690	X	X	X	X	X	X	X	X
1826 w #7550		X		X		X		X
2701	X	X	X	X	X	X	X	X
2703	X	X	X	X	X	X	X	X
2780	X	X	X	X	X	X	X	X
3115-3138 w #4640	X	X	X	X	X	X	X	X
3271				X		X		X
3275			X	X	X	X	X	X
3735	X	X	X	X	X	X	X	X
3651-A60, B60			X		X			
3661			X					
3680	X	X	X	X	X	X	X	X
3704, 3705	X	X	X	X	X	X	X	X
3741 mdl 2, 4	X	X	X	X	X	X	X	X
3747	X	X	X	X	X	X	X	X
3771, 3773, 3774, 3775	X	X	X	X	X	X	X	X
3776	X	X	X	X	X	X	X	X
3777								X
3780	X	X	X	X	X	X	X	X
4331 w #1601	X	X	X	X	X	X	X	X
5231 mdl 2			X	X	X	X	X	X
5265	X	X	X	X	X	X	X	X
5285, 5288 w #2500	X	X	X	X	X	X	X	X
S/3 w #2074	X	X	X	X	X	X	X	X
S/7 w #2074	X	X	X	X	X	X	X	X
S/32 w #2074	X	X	X	X	X	X	X	X
S/34 w #2500	X	X	X	X	X	X	X	X
S/360-20 w #2074	X	X	X	X	X	X	X	X

| S/360-25 w #4580 | X | X | X | X | X | X | X |

SPEED (bps)	2 of 2	4800	7200
LINE INTERFACE		#7151-4 or #7131/2	#7151-4 or #7131/2
FACILITY		D6	D7
1131 w #7690		X	
1826 w #7550		X	
2701		X	X
2703		X	
2780		X	
3115-3138 w #4640		X	X
3271		X	X
3275		X	X
3735		X	
3680		X	
3704, 3705		X	X
3776		X	
3777		X	X
3780		X	X
4331 w #1601		X	
5231 mdl 2		X	
5285, 5288 w #2500		X	
S/3 w #2074		X	X
S/7 w #2074		X	X
S/32 w #2074		X	X
S/34 w #2500		X	X
S/360 mdl 20 w #2074		X	X
S/360 mdl 25 w #4580		X	

Notes:

- RPQ attachment capabilities are not included.
- See M2700 pages for additional information on IBM- and PTT-mandatory modems.
- Facility meanings:  
C - Switched line, stand-alone modem  
CA - Switched line, integrated modem  
D - Leased line, stand-alone modem  
DA - Leased line, integrated modem

FIGURE 4A IBM LINE ADAPTERS

| BSC | S/S to | S/S (1) to |

FACILITY	IBM 1200 bps Line Adapter	600 bps --Leased Line Adapter	1200 bps --1200 bps Line Adapter
Nonsw PTP	#4781	#4743	#4781
Nonsw MP control	#4781	#4743	#4781
Nonsw MP tributary	#4781	---	---

- Only with the 3767 terminals.

FIGURE 4D LINE ADAPTER BASE 3

Maximum: 12 IBM Line Adapters.

LINE POSITION	LINE ADAPT	LINE ADAPTER POSITION SPECIFY	PREREQ	Note
A5 1st line	#4743	#9485(2)	#1242	
A5 2nd line	#4743	#9486(2)	#9485	
A6 1st line	#4743	#9487(2)	#1242	
A6 2nd line	#4743	#9488(2)	#9487	
A7 1st line	#4743	#9489(2)	#1242	
A7 2nd line	#4743	#9490(2)	#9489	
A8 1st line	#4743	#9491(2)	#1242	
A8 2nd line	#4743	#9492(2)	#9491	

---OR---

A1 (1)	#4743 #4781	#9481, #9501(2)	#1231 (3)
A2 (1)	#4743 #4781	#9482, #9502(2)	#1231 (4)
A3 (1)	#4743 #4781	#9483, #9503(2)	#1231 (5)
A4 (1)	#4743 #4781	#9484, #9504(2)	#1231 (6)
S1	#4781	#9493(2)	#7141 (7)
S2	#4781	#9494(2)	#7142 (8)
S3	#4781	#9495(2)	#7143 (9)
S4	#4781	#9496(2)	#7144 (10)

- #4781 may be used only with the 3767 terminal.
- CPU diskette-only feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on a purchased machine to include any number of diskette-only changes ordered on same diskette.
- Excludes line adapter in position S4 (#9496).
- Excludes line adapter in position S3 (#9495).
- Excludes line adapter in position S2 (#9494).

6. Excludes line adapter in position S1 (#9493).
7. Excludes line adapter in position A4 (#9484).
8. Excludes line adapter in position A3 (#9483).
9. Excludes line adapter in position A2 (#9482).
10. Excludes line adapter in position A1 (#9481).

## FIGURE 5 MAXIMUM ICA CONFIGURATION

All line/line pairs are assigned load factors.

The sum of all load factors must not exceed 100% if SLHS is not installed.

The sum of all load factors must not exceed 200% if SLHS is installed.

### LOAD FACTOR IN %

ASYNCHRONOUS LINES	--Line Pairs--			
	1-2	3-4	5-6	7-8
TLP at 50 bps	20	20	40	40
TLP at 75 bps	20	40	60	80
ALP at 75, 100 and 134.5 bps	20	40	60	80
2nd Line Group (ALG1 & ALG2) 5 to 8 lines				
1st Line Group (ALG1) Up to 4 lines				
	v		v	
AL at 200/300/600 bps	20		40	

SYNCHRONOUS LINES	1-2 Lines		3-4 Lines	
	No	Yes	No	Yes
SL and SLC w max. 1200 bps	20	25	20	25
SL and SLC w max. 2400 bps	20	25	40	50
SL w max. 4800 bps	40	50	80	100
SL w max. 7200 bps	60	75		
	1 Line		2 Lnes	
SLLL w max. 4800 bps	20	25	20	30
SLLL w max. 7200 bps	20	30	40	60

## VIDEO DISPLAY/KEYBOARD CONSOLE LANGUAGE COMBINATION

Part 1 of 2	Name	
	Plate	
Language	and OP	Manual
	Panel	OPS
UK English #2927	English	English
Danish #2936	English	English

Fin./Swed. #2937	English	English
Ger./Aust. #2929	German	German
German Option		
US KB #2857	German	German
French Option	French	French
US KB #2864		
Italian #2932	Italian	Italian
Italian Option		
US KB #2868	Italian	Italian
Spanish #2931	Spanish	Spanish
Portuguese #2938	English	English
Norwegian #2939	English	English
English #2750	English	English
Belgium #2971	French	French
Spanish-speaking #2969	Spanish	Spanish
Japanese #2930	Japanese	English

## Part 2 of 2

Language	Keyboard	Screen
UK English #2927	UK	UK
Danish #2936	Danish	Danish
Fin./Swed. #2937	Finnish	Fin./Swed
Ger./Aust. #2929	German	German
German Option		
US KB #2857	Ger./US	US
French Option	Fr./US	US
US KB #2864		
Italian #2932	Italian	Italian
Italian Option		
US KB #2868	Itl./US	US
Spanish #2931	Spanish	Spanish
Portuguese #2938	Por.	Por.
Norwegian #2939	Nor.	Nor.
English #2750	US	US
Belgium #2971	AZERTY	US
Spanish-speaking #2969	Spanish-speaking	Spanish-speaking
Japanese #2930	US	US

## MODEL CONVERSIONS

**Planning for Model Conversions:** When a customer requires feature changes and/or memory upgrades in addition to a model upgrade, consolidating the several changes into a single MES is not recommended. In these cases a planning session between sales, CE and the customer is required to develop the proper sequence of MES ordering. Field installable.

From	To	G	GE	GF	H			
FE		x	x	x	x			
G			x	x	x			
GE				x	x			
GF					x			
From	To	FE2	G2	GE2	GF2	H2	HG2	I2
FE		x	x	x	x	x	x	x
G			x	x	x	x	x	x
GE				x	x	x	x	x
GF					x	x	x	x
H						x	x	x
FE2			x	x	x	x	x	x
G2				x	x	x	x	x
GE2					x	x	x	x
GF2						x	x	x
H2							x	x
HG2								x

**IBM** IBM Canada Ltd.

**MACHINES**

**M 3125.10**  
JUN 86

**ACCESSORIES (NONE)**

**SUPPLIES**

Contact IBM.

## 3135 PROCESSING UNIT

### THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

(NO LONGER AVAILABLE)

The 3135 is NO LONGER AVAILABLE. Features and model changes can be ordered on an 'as available' basis.

### PURPOSE

Has main and control storage, plus arithmetic and logic circuits for a S/370 model 135.

### MODELS F - I

**Model FE FE0:** 98,304 bytes of processor storage

**Model GD GD0:** 147,456 bytes of processor storage

**Model GF GF0:** 196,608 bytes of processor storage

**Model H H00:** 262,144 bytes of processor storage

**Model HF HF0:** 327,680 bytes of processor storage

**Model HG HG0:** 393,216 bytes of processor storage

**Model I I00:** 524,288 bytes of processor storage

**Prerequisites:** Each 3135 requires a 3046 Power Unit. See M3046 pages.

### HIGHLIGHTS

Depending on the mdl, up to 524,288 bytes of processor storage are available. CPU cycle time varies from 275 to 1485 nanoseconds, depending on the internal operation being performed. 16 general-purpose and four floating point registers are provided.

Capability to natively attach a 2319 Disk Storage mdl A1 (and additional 2319 mdl A3, 2312 or 2318 Disk Storage). Capability to natively attach one or two 3333 Disk Storage and Control modules. Capability to natively attach one or two 3340 Direct Access Storage Facility mdl A2s. See 3340 and 3333 in "Machines". Capability to natively attach a 1403 Printer mdl 2, 7 or N1. See "Special Features." Note: 2312s, 2318s, and 2319 all mdls are no longer available.

Virtual storage capability to increase the effective utilization of main storage.

Up to eight teleprocessing lines are attachable via the Integrated Communications Adapter (#4640).

Standard features include a commercial instruction set, additional S/370 instructions, Extended Control (EC) Mode, Dynamic Address Translation, Channel Indirect Data Addressing, Program Event Recording, interval timer, time-of-day clock, store and fetch protect, console file, byte-oriented operand feature, error checking and correction on main and control storage, automatic instruction retry, channel command retry, byte multiplexer channel, OS/DOS Compatibility Feature, and audible alarm.

A standard console file is the basic microprogram loading device for the system. The console file contains a small, low-performance, read-only file device that provides all the microcode for the system on removable magnetic disk cartridges. The disks supplied with the system contain all of the required microcode for the basic system, the optional features ordered for the system, and CE diagnostics.

An optional Clock Comparator and Timer provide additional timing facilities for the programmer.

**Control Storage Requirements:** Reloadable Control Storage is housed in the 3135 and is loaded from the Console file. 24,576 bytes of control storage are standard; two additional increments of 12,288 bytes are available if required to support special features.

### Table of Control Storage Requirements

- Basic Systems Microcode; 15,482 bytes
- APL Assist (#1005); 13,800 bytes
- Conditional Swapping (#1051); 300 bytes
- Autocall (#1290)\*; 440 bytes
- Block Multiplexer Channel (#1421); 1,568 bytes
- Block Multiplexer Shared Subchannel (#1431); 14 bytes
- Clock Comparator and CPU Timer (#2001); 1,400 bytes
- OCR Multifont (#2989); 380 bytes
- Direct Control (#3274); 50 bytes
- Extended Precision Floating Point (#3840); 676 bytes
- Floating Point (#3900); 1,200 bytes
- 64 Multiplexer Subchannels (#3905); 1,024 bytes
- 128 Multiplexer Subchannels (#3906); 2,048 bytes
- 256 Multiplexer Subchannels (#3907); 4,096 bytes
- 1401/1440/1460 Compatibility (#4457); 4,492 bytes
- Integrated Communications Adapter (#4640); 2,100 bytes
- 2319 Integrated File Adapter (#4650); 4,652 bytes (Not Available)
- 3333/3340 Series IFA (#4655) w/#9313; 10,192 bytes
- 3333/3340 Series IFA (#4655) w/#9314; 9,768 bytes
- 3333/3340 Series IFA (#4655) w/#9315; 12,800 bytes
- 3333/3340 Series IFA (#4655) w/#9316\*\*\*; 300 bytes
- 3333/3340 Series IFA (#4655) w/#9317 + +; 2,200 bytes
- IFA Conversion (#4645); 2,048 bytes
- Integrated Printer Adapter Basic Control (#4670); 1,300 bytes
- Integrated 1403 Printer Mdl 2/N1 Attachment (#4672); 0 bytes
- Integrated 1403 Printer Mdl 7 Attachment (#4677); 0 bytes
- Virtual Machine Assist (#8740); 2,000 bytes
- First or First & Second Selector Channel(#6981,#6982); 1,584 bytes
- S/360 mdl 20 Compatibility (#7520); 876 bytes
- 3210 Mdl 1 Adapter (#7844); 1,494 bytes
- 3215 Adapter (#7855); 1,930 bytes
- 2314/3340 Compatibility (#8070); 6,400 bytes (2314 A1/B1 Not Available)
- String Switch Attachment (#9841) w/#9313; 300 bytes
- String Switch Attachment (#9841) w/#9314; 370 bytes
- String Switch Attachment (#9841) w/#9315; 334 bytes
- String Switch Attachment (#9841) w/#9316\*\*\*; 0 bytes
- Synchronous Data Adapter Type II (#9649-#9656)\*; 3,700 bytes
- Adapter Base Type I +\*; 1,200 bytes
- Terminal Adapter Type I Model II (#9721-#9728) +\*; 1,700 bytes
- Terminal Adapter Type III (#9753-#9760)\*; 2,100 bytes
- Fixed Head Attachment (#9190) with #9314; 300 bytes
- Fixed Head Attachment (#9190) with #9315; 300 bytes

\* The specified control storage is required only once for any number of lines of one type.

+ For Terminal Adapter Type I Mdl II, the control storage required is the Adapter Base Type I plus the control storage for the Terminal Adapter Type I Mdl II. One copy of Adapter Base Type I is automatically included whenever this adapter is ordered.

+ + Requires #9314.

\*\*\* Requires either #9313 or #9315.

For the basic system and applicable special features, total the control storage requirements given in the table. If the total exceeds 24,576 bytes, First 12K Control Storage Increment (#7861) is required. If the total exceeds 36,864 bytes, Second 12K Control Storage Increment (#7862) is also required.

**Limitations:** The maximum configuration that can operate at any one time is determined by the available control storage (maximum 49,152 bytes). Alternate feature configurations can be operated by utilizing additional magnetic disk cartridges with another set of 3135

features. Alternate cartridges for an installation with be available by RPQ.

**Virtual Storage:** Extended Control (EC) Mode expands the structure of the Program Status Word to accommodate the control of additional S/370 features and extends the number of permanently assigned main storage locations. The S/370 mdl 135 can operate in either EC Mode or Basic Control (BC) Mode as defined for the S/360. Dynamic Address Translation (DAT) is a standard feature on the S/370 mdl 135. When the S/370 mdl 135 is in Extended Control (EC) Mode with Translation Mode operable, program addresses are treated as "logical addresses" and the translation feature develops "real addresses". Since logical storage addressing is not limited by the amount of available real storage, program size may exceed real storage size. This logical storage is referred to as "virtual storage" and may be as large as 16,777,216 bytes on the S/370 mdl 135. For I/O operations, Channel Indirect Data Addressing provides a means to transmit data that spans pages in non-contiguous real storage.

Program Event Recording, a standard feature, is a debugging aid which permits four types of events to be selectively monitored in a virtual environment: (1) successful branches; (2) instruction fetch address compare; (3) main storage alteration address compare; (4) general-purpose register alteration address compare.

Input/Output Attachments: A wide variety of I/O devices may be attached to the S/370 mdl 135 via the standard byte multiplexer and optional selector channels. There are, additionally, five direct attachment features for the 3135. They are:

1. Console Printer-Keyboard (required): This unit serves as the online I/O device for operator/system communications. It provides a means of manually entering data into the system, altering or displaying data already in storage, and for printing error logout messages.
2. 2319 Integrated File Adapter (#4650) (Optional): This feature enables native attachment of a 2319 Disk Storage mdl A1 (and a 2319 mdl A3, 2312 mdl A1s, or 2318 mdl A1), up to a total of eight drives. The IFA is addressed as channel 1. Limitations: Cannot be installed if 3333/3340 Intermix (#9315) is specified when 3330/3340 Series IFA (#4655) is also ordered.
3. 3330/3340 Series Integrated File Adapter (#4655) (Optional): This feature allows the native attachment of one or two 3333 modules or 3340 A2 units. Each 3333 module (either mdl 1 or mdl 11) can attach up to three 3330 modules (any combination of mdls 1, 2 or 11). Each 3340 mdl A2 can attach 3340 mdl B2 or B1 units, and one 3340 mdl A2 can also attach 3344 units to a maximum of eight drives. One but not both 3340 mdl A2s which can attach to an IFA may have up to three 3344s attached. Maximum is 16 drives per IFA. If 2319 IFA (#4650) is also present, IFA Conversion (#4645) is required.
4. Integrated Communications Adapter (#4640) (Optional): This feature provides attachment of up to eight teleprocessing lines to the 3135. These may be any combination of supported BSC and Start/Stop lines and appear to the processor as if connected via one or more 2701s on the byte multiplexer channel.

Integrated Printer Adapter (Optional): This feature enables native attachment of a 1403 Printer mdl 2, 7 or N1. The Universal Character Set Feature can be optionally specified on the 1403 mdl 2 or N1.

## Input/Output Channels

**Byte Multiplexer Channel:** One is standard on the 3135 and is functionally equivalent to the byte multiplexer channel on S/360 mdl 22, 25, 30, 40, 50. Sixteen subchannels are provided as standard, with the option to extend to 64, 128 or 256. See "Special Features". From the number of subchannels chosen, one must be allocated to the Console Printer-Keyboard (see "Specify") and one to each ICA line installed. The byte multiplexer channel provides eight control unit positions and permits I/O units to operate normally in byte mode, giving the effect of several I/O operations simultaneous with computing. Burst mode operation of unbuffered devices operating in excess of 10KB is not allowed for concurrent operation with the In-

tegrated File Adapter, the Integrated Communications Adapter, or a Selector Channel. See "IBM S/370 Mdl 135 Channel Characteristics Manual", GA33-3010 for further clarification. For OS exclusion, refer to "System Generation", GC28-6554.

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Additional, in "Special Features".

**Selector Channels:** Two are available as special features. Data rates are 1.3 megabytes per second. Direct access devices may be attached to selector channels and/or to the Integrated File Adapters. If either or both the 2319 IFA and the 3330/3340 IFA is present, the following applies:

- Direct access devices should be attached to the higher priority selector channel (normally the first).
- If the device on the higher priority selector channel is the 3330/3340 Disk Storage Series, the lower priority selector channel should be limited to devices with data rates not exceeding 144KB per second.
- The selector channel priorities for command chaining may be reversed by specifying Channel Priority (#1501).

If the 3330/3340 Series IFA or both IFAs are present without additional direct access devices attached via a selector channel, tape units on selector channels 2 and 3 are limited to an aggregate 950KB.

If an IFA is not present, two channels of 3330/3340/3350 Series DASD can be attached. For additional information and limitations, see "S/370 Mdl 135 Channel Characteristics", GA33-3010.

**Note:** If Block Multiplexer Channel(s) are installed, subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. Also see Block Multiplexer Shared Subchannels in "Special Features".

**Console Function:** A standard system control panel is located on the 3135. It has switches and lights necessary to operate and control the system. A system console I/O function is provided with either of two alternatives. Feature #7844 attaches the 3210 Console Printer-Keyboard mdl 1 (15.5 cps) on the console table reading board. Optionally, the 3215 Console Printer-Keyboard (85 cps) may be attached via feature #7855. A right reading board extension is standard on the 3135; a left extension is not available. Either feature #7844 or #7855 is required in the system. See "Special Features".

Publications: GC20-0001

## SPECIFY

- Power (AC, 3-phase, 4-wire, 50/60 Hz):

50 Hz	60 Hz
220V #2815	208V #9903
235V #2818	230V #9905

**Note:** 200V (#2807, #2733) not available.

- Order the Online Test System (OLTS) for your customer's configuration as required: Initially, or when being modified.
- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Cabling: #9080 for below the floor; #9081 for on the floor.
- Console Printer Keyboard Address: Recorded on console file disk at the plant #9101\* for "01F" or #9102\* for "009".
- Console Printer-Keyboard: A 3210 mdl 1 or 3215 is required in every system. See M3210, 3215 pages and "Special Features" below.

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

- Control Panel Language Group: #2927 for English, #2928 for French, #2929 for German.
- Keyboard and Printer Language Groups (must be specified on 3135 for the 3210 and 3215):

English US	#2956	Portuguese	#2961
French	#2964	Spanish	#2961
Italian	#2968		

All are diskette-only features.

- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3135 Frame 01 (CPU) are 31-1/2 in. wide x 70 in. long x 60 in. high. Removal of the side covers will reduce the width to 29-1/2 inches. If further reduction in length is required, specify #9570. Shipping dimensions will then be 29-1/2 inches wide x 60 inches long x 60 inches high.

## SPECIAL FEATURES

**APL Assist (#1005):** Provides performance assist to APL programs when used with VS APL PP (#5748-AP1). Prerequisites: #7861, #7862 and #3900. Field Installation: Yes.

**Conditional Swapping (#1051):** Provides two additional instructions: COMPARE and SWAP COMPARE DOUBLE and SWAP. This feature is a prerequisite for the execution of VTAM programming support and for TCAM/NCP. Field Installation: Yes.

**Autocall (#1290):** (Canada only) Provides automatic calling capabilities on facilities C1, C2, C3, C4, C5 or C6 to initiate (dial), through stored program control, a data link to a remote station. For the appropriate calling units, see M2700 pages. Specify: Refer to Table 1C for Terminal Adapter Type I Mdl II or Table 1E for Synchronous Data Adapter Type II for appropriate feature code according to line positions desired. Limitations: Each Autocall feature installed reduces the number of lines available on the ICA by one. Autocall must be ordered once for each line where the function is desired. Thus, the ICA can accommodate a maximum of four lines if each of these lines also has the Autocall feature. A single Autocall feature can be associated with any of the lines from one to seven. When operating with the DCEIA Autocall unit in the UK, Autocall is limited to calls within the United Kingdom. Cable Order: Required. Maximum: Four. This feature must be ordered only once for each line position required. Prerequisites: 9721-9728 or 9649-9656; and 9625-9632. Field Installation: Yes.

**Block Multiplexer Channel (#1421):** Increases the efficiency of the 3330/3340 Series IFA and selector channel(s) when using direct access storage devices equipped with rotational position sensing or other devices capable of disconnected command chaining. The disconnected command chaining feature of the channel allows multiple devices to perform non-data transfer operation concurrently with one data transfer operation. This permits increased utilization of the channel(s) by performing operations of other devices while the channel would normally have been waiting on one device. The feature provides 16 non-shared and one shared selector subchannel. The shared selector subchannel may attach a control unit having a maximum of 16 device addresses. Devices on a block multiplexer channel which cannot utilize the block multiplexer feature will function as if attached to a conventional selector channel. Maximum: One. Applies to both selector channels and to the 3330/3340 Series IFA. Field Installation: Yes. Prerequisites: #6981 or #4655.

**Block Multiplexer Shared Subchannel (#1431):** (Note: This feature should only be installed if devices capable of "Block Shared" operation are installed on the block multiplexer channel. See "I/O Configuration Form", GA22-7002.)

Allows any one of the following combinations of "Non-Shared", "Block Shared", or selector subchannels to be attached to the Block Multiplexer Channel (#1421): (1) 16 non-shared and one shared selector (see "Address Restrictions") --- (2) 8 non-shared, 8 block shared, and 1 shared selector (see "Address Restrictions") --- (3) 8 non-shared, 4 block shared, 1 shared selector (see "Address Re-

strictions"). If option (2) is selected, then each block shared subchannel may have attached to it a control unit having a maximum of 16 device addresses. If option (3) is selected, the four block shared subchannels may each have attached a control unit having a maximum of 32 device addresses. If option (1) is selected, no block shared subchannels are available, and addresses X00 through X7F are not available. With any option, the selector subchannel may have attached to it control units with a maximum of 16 device addresses. This feature will apply to both selector channels if installed. The options are selectable by the Customer Engineer and may be defined differently on each channel. Maximum: One. Field Installation: Yes. Prerequisites: #1421.

**Address Restrictions with #1431:** a) Addresses X00 through X7F are assigned as block shared subchannels. With option (1), they may not be used. With option (2), each control unit address position, i.e., X00, X10, X20, etc., through X70 is available. With option (3), "even" control unit address positions only are available, i.e., 00, 20, 40 and 60. b) Selector and non-shared addresses are limited to addresses X80 through XFF.

**Channel Priority (#1501):** When the IFA (#4650 or #4655) and both selector channels are present, this feature changes the higher priority for command chaining from the first selector channel (Channel 2) to the second selector channel (Channel 3). #1501 is required if any DASD devices are to be attached to Channel 3. Field Installation: Yes. Prerequisites: #4650 or #4655 and both #6981 and #6982.

**Clock Comparator and CPU Timer (#2001):** The Clock Comparator provides a means of causing an interruption when the time-of-day clock has passed a program-specified value. The CPU Timer is a binary counter which is decremented every microsecond but has a resolution of 16 microseconds. It provides a means for measuring elapsed CPU time by causing an interruption when a pre-specified amount of time has elapsed. Maximum: One. Field Installation: Yes.

**200 bps (#2711-#2718):** Allows the Terminal Adapter Type 1 Mdl II to operate at 200 bps. Specify: Refer to Table 1-C for appropriate feature code according to the line positions desired. Prerequisites: Terminal Adapter Type 1 Mdl II. Field Installation: Yes.

**OCR Multifont (#2989)\*:** Permits the execution of the Multifont Preprocessor programming support. The programming support, in turn, provides a means of translating input data produced by the Multifont Preprocessor feature of the 1287 mdl 5 and the 1288 mdl 1 to EBCDIC characters. Field Installation: Yes. Prerequisites: Terminal Adapter Type 1 Mdl III.

**Direct Control (#3274):** Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processing units, or cable-connected processing unit and external devices. Maximum: One. Cable Order: Required. Field Installation: Yes. Prerequisites: External devices must meet the interface specifications outlined in "S/360 Direct Control Feature - OEMI", GA22-6845.

**Emergency Power-Off Control (#3621, #3622):** To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see "S/370 Installation Manual - Physical Planning", GC22-7004. Field Installation: Yes.

**Extended Precision Floating Point (#3840):** Extends the precision of floating point instructions to 28 hexadecimal digits. Field Installation: Yes. Prerequisites: #3900.

**Floating Point (#3900):** Adds 44 floating point arithmetic instructions, which, with the Standard Set, make up the Scientific Instruction Set. Field Installation: Yes.

**Multiplexer Subchannels, Add'l (#3905-#3907):** To increase the number of I/O devices on the byte multiplexer channel, the number

of subchannels can be increased by specifying one of the following: #3905 for 64 subchannels, #3906 for 128 subchannels, #3907 for 256 subchannels. The maximum number of shared subchannels is eight. When 256 subchannels are installed, there are no shared subchannels. Also see "Byte Multiplexer Channel" under "Input/Output Channels" above. Note: The number of subchannels ordered must be equal to or greater than the device addresses. Field Installation: Yes.

**1401/1440/1460 Compatibility (#4457):** Microprogrammed controlled feature, which, in combination with special software, permits the system to execute 1401/1440/1460 instructions. Field Installation: Yes.

**Integrated Communications Adapter (#4640):** Provides the circuits and controls for direct attachment of up to eight teleprocessing lines to the 3135. The controls for the first line adapter are included in this feature. Lines can be any combination of Start/Stop or BSC. Provides for the attachment of 1050, 2260 mdl 1, 2260 mdl 2, 2265 mdl 1, 2740 mdl 1, 2740 mdl 2, 2741 mdl 1, 2760 mdl 1, 5010 AXX, or any IBM computer, multiplexer, or terminal conforming to the Binary Synchronous Communication (BSC) standard. Note: In addition to the appropriate adapter, each communication line attached to the system requires an external modem. Refer to Table 2 below to define customer configuration requirements prior to ordering features below. Customer Responsibilities: See M2700 pages for customer responsibilities regarding communication facilities and servicing requirements. Communications Facilities: See M2700 pages for communication facility requirements with this feature. Field Installation: Yes

See "Specify Requirements for Integrated Communication Adapter" under "Specify".

**IFA Conversion (#4645):** Permits co-residence of both 2319 IFA (#4650) and 3330/3340 Series IFA (#4655). Both IFAs are addressed as Channel 1. Limitations: Cannot be installed if 3333/3340 Intermix (#9315) or 3344 Attach (#9317) is specified. Cannot be installed with 2314/3340 Compatibility Feature (#8070). Maximum: One per 3135. Prerequisites: #4650 and #4655. Field Installation: Yes.

**2319 Integrated File Adapter (#4650):** Permits native attachment of a 2319 Disk Storage mdl A1 (and a 2319 mdl A3, 2312 mdl A1, or 2318 mdl A1) up to a total of eight drives. Standard features include file scan and record overflow functions. The IFA is always addressed as channel 1. Note: 2312 mdl A1s, 2318 mdl A1s, and 2319 all mdls are no longer available. Limitations: Cannot be installed if 3333/3340 Intermix (#9315) is specified. Cannot be installed with 2314/3340 Compatibility (#8070). Maximum: One per 3135. Prerequisites: #4645 is required if installed with 3330 or 3340 Series IFA (#4655). Field Installation: Yes.

**3330/3340 Series Integrated File Adapter (#4655):** Permits native attachment of up to two 3333s or 3340 mdl A2s. A maximum of sixteen 3330 or 3340 Series drives may be attached to the IFA. The IFA supports rotational position sensing, disconnected command chaining, and multiple requesting. Record overflow is standard. For 3330, standard I/O addresses are (hex) 150 through 15F. For 3340, standard addresses are (hex) 1C0 through 1CF. For 3340 with 3344 standard addresses are (hex) 1C0 through 1E1. Maximum: One. Prerequisites: #4645 is required if installed with 2319 IFA (#4650). Field Installation: Yes. Note: 2319 all mdls no longer available.

#### Specify:

1. DASD Designation. Specify ONE of the following: #9313\* (DASD 3333/3330) to attach up to two 3333 mdl 1s, each with up to three 3330 mdl 1, 2 in any combination. #9314\* (DASD 3340 only) to attach up to two 3340 mdl A2s, each with up to three 3340 mdl B1, B2 in any combination. #9315\* (3333/3340 Intermix) to attach one 3333 mdl 1 (with up to three 3330 mdl 1, 2 in any combination) plus one 3340 mdl A2 (with up to three 3340 mdl B1, B2 in any combination). #9315 cannot be installed with IFA Conversion Feature (#4645).

2. If any 3333 mdl 11 and/or 3330 mdl 11 is to be attached, also specify #9316\* (3333/3330 mdl 11) in addition to #9313 or #9315.

With #9313 plus #9316 a mixture of one 3333 mdl 1 and one 3333 mdl 11, each with up to three 3330 mdl 1, 2 and 11 (in any combination) can be attached, or two 3333 mdl 11s, each with any mixture of up to three 3330 mdl 1, 2 and 11.

With #9315 plus #9316, one 3333 (either mdl 1 or mdl 11) with up to three 3330 mdl 1, 2 and 11 (in any combination) can be attached in addition to one 3340 mdl A2 with up to three associated mdl B1, B2. The standard addresses with #9315 for 3330 are (hex) 150 through 157, for 3340 (hex) 158 through 15F.

3. If any 3344 is to be attached, specify #9317\* in addition to #9314 (#9317 and #9315 are mutually exclusive). #9190\* must also be specified if 3344 mdl B2Fs or the 3340 Fixed Head Feature (#4301, #4302) is ordered.

With #9314, #9317 and #9190 up to three 3344 mdl B2/B2F and/or 3340 mdl B2, B1 units in any combination can be attached to one 3340 mdl A2. The second 3340 mdl A2 if present can attach up to three 3340 mdl B1/B2 units.

#9317 is mutually exclusive with IFA Conversion Feature (#4645) and with 2314/3340 Compatibility Feature (#8070).

4. When just #9314 is specified, also specify 3340 Address Designation: #9820\* for addresses (hex) 1C0 through 1CF, or #9821\* for addresses (hex) 160 through 16F. The specification of 160 allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFAs.

5. When #9314 or #9315 is specified, also specify #9190\* (Fixed Head Attachment) if Fixed Head Feature (#4301, #4302) is ordered for any 3340 attached to the IFA.

6. If String Switch (#8150) is ordered for any attached 3333 or 3340 mdl A2, specify String Switch Attachment (#9841)\*.

7. When #9821\* is specified in conjunction with #9813 the addresses for the 3333/3330s are (HEX) 160 thru 16F.

8. When #9821\* is specified and both #9314 and #9317 are specified the addresses for the 3340/3344s are as follows:

	3340 A2				3344 B2/B2Fs			
S	*	*	*	*	*	*	*	*
t	160 161	162 163	164 165	166 167	168 169	16A 16B	16C 16D	16E 16F
r	*	*	*	*	*	*	*	*
i	172 173	174 175	176 177	178 179	17A 17B	17C 17D	17E 17F	170 171
n	1E2 1E3	1E4 1E5	1E6 1E7	1E8 1E9	1EA 1EB	1EC 1ED	1EE 1EF	1E0 1E1
g	1F2 1F3	1F4 1F5	1F6 1F7	1F8 1F9	1FA 1FB	1FC 1FD	1FE 1FF	1F0 1F1
0	*	*	*	*	*	*	*	*

1	168 169	16A 16B	16C 16D	16E 16F
	*	*	*	*

Physical Drive:

0 1 2 3 4 5 6 7

Note 1: The DASD control combinations that can be attached to the 3330/3340 Series IFA (#4655) are shown in the left hand column of the table below. From Section A of the table select one of the feature numbers shown (one and only one must be selected). From Section B select the feature number(s) required to support your configuration (select none, one, or more than one from Section B). Section C of the table shows the addresses available. The specification of the (hex) 160 addresses allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFA. Select a number from Section C if required.

Note 2: Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.

3135 3330/3340 IFA (#4655)

*-----*					
S	DASD Control	3333	3333/	3340	
e	Combinations	Disk	3340	Direct	
c	on	Stor	Inter-	Access	
t	IFA (#4655)	Cntrl	mix	Storage	
				Facility	
-					
A	DASD	#9313*	#9315*	#9314*	
	Designation				
	one req'd				
-					
	If any 3333	#9316*	#9316*	-	
	mdl 11				
	and/or 3330				
	mdl 11				
-					
B	3344	-	-	#9317*	
	3344 mdl B2F	-	-	#9317*	
				+ #9190F	
-					
	Fixed Head	-	#9190*	#9190*	
	Feature				
	(#4301/				
	#4302)				
	on 3340				
-					
	String	#9841*	#9841*	#9841*	
	Switch				
	(#8150) on				
	3333/3340				
-					
	2314/3340	-	-	** #8070	
	Compat-				
	ibility				
	Feature				
	see #8070)				
-					
	3330/3340				
	Supports RPS				
	Disconnected				
	Command	#1421	#1421	#1421	
	Chaining				
	Multiple				
	Requesting				
	if Block				
	MPX #1421				
	installed				
-					
	2319 IFA	#4645	-	***	
	(#4650)			#4645	
*-----*					
*-----*					
C	Standard	*Hex	*3330	#9820*	3344
		150-	Hex	Not	Hex
		-15F	150-	3344	1C0-
			3340	Hex	IE1
			Hex	1C0-	
			158-	1CF	
			15F	1CF	
-					
	Address	#9821*	-	#9821*	See
	160	Hex		Not	Item
		160-		3344	8
		16F		160-	above
				16F	
*-----*					

\* No feature number required.

\*\* Mutually exclusive with String Switch (#9841, 2319 IFA (#4650), IFA Conversion feature (#4645), 3344 Attachment (#9317).

\*\*\* Mutually exclusive with 3344 Attachment (#9317) and 2314/3340 Compatibility (#8070).

**Integrated Printer Adapter Basic Control (#4670):** Provides the power supply and basic control for a natively attached 1403 Printer. The standard address is '00E'. Specify: #9485\* if optional address of '00F' is desired. Maximum: One. Field Installation: Yes.

See table below for corresponding voltages for 50 Hz.

CPU	1403
220V	220V
235V	220V
380V	380V
408V	308V

Note: If the optional addresses of '01F' for the Console Printer Keyboard (#3210 or #3215) and '00F' for the integrated 1403 are both used, Multiplexer Subchannels, Add'l (#3905) must be specified.

**Integrated 1403 Printer Mdl 2/Mdl N1 Attachment (#4672):** Provides control for attaching 1403 mdl 2 or mdl N1. Specify: #9182\* to attach 1403 mdl 2, #9188\* to attach 1403 mdl N1. Maximum: One. Prerequisites: #4670. On the 1403, #9709 and #9725 are required on a mdl 2; #9726 is required on a mdl N1. See Specify under 1403. Field Installation: Yes.

**Integrated 1403 Printer Mdl 7 Attachment (#4677):** Provides control for attaching 1403 mdl 7. Maximum: One. Prerequisites: #4670. On the 1403, #9725 is required on a mdl 7. See "Specify" under 1403. Field Installation: Yes.

**Additional Lines (#4722-#4728):** Each provides circuits and controls for attachment of an additional line adapter, for a total of eight lines in the system. Specify: Order additional lines according to line position required. See Table 1-A. Each line specified requires the next lower order line as a prerequisite. Maximum: One of each (#4722 through #4728). Field Installation: Yes. Prerequisites: #4640.

**Specify Requirements For Integrated Communications Adapter:** For each line (#4722-#4728) attached to the ICA, including the first line included in #4640, one of the following line adapters must be specified: Terminal Adapter Type 1 Mdl II (#9721-#9728), Terminal Adapter Type III (#9753-#9760), or Synchronous Data Adapter Type II (#9649-#9656). Each line adapter and all associated features must be specified according to the line position to which they correspond. Refer to Table 2 below prior to ordering features for the ICA. For limitations of ICA line speeds, refer to "135 Channel Characteristics", GA33-3010.

**Selector Channel (#6981, #6982):** Each adds a high-speed channel to the system. The channel permits overlapped I/O operation with processing. Eight control unit positions are provided on each channel. If an Integrated File Adapter (#4650 or #4655) is present, these channels are addressed as 2 and 3, respectively. Otherwise, they are addressed as 1 and 2. #6981 for first selector channel, #6982 for second. Field Installation: Yes. Prerequisites: #6982 requires #6981.

**S/360 Mdl 20 Compatibility (#7520):** Microprogram-controlled feature, which, in combination with special software, permits the system to execute S/360 mdl 20 or S/360 mdl 25 in mdl 20 mode instructions. Field Installation: Yes.

**3210 Mdl 1 Adapter (#7844):** To attach a 3210 Console Printer-Keybaord mdl 1 (15.5 cps) for systems console I/O; includes an alter-display ability. Maximum: One. Limitations: Cannot be installed with 3215 Adapter (#7855). Field Installation: Yes. Prerequisites: Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

**3215 Adapter (#7855):** To attach a 3215 Console Printer-Keybaord (85 cps) for system console I/O; includes alter-display ability. Max-

imum: One. Limitations: Cannot be installed with 3210 mdl 1 Adapter (#7844). Field Installation: Yes. Prerequisites: Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

**12K Control Storage Increments (#7861, #7862):** Each adds 12,288 bytes of control storage. Required for some feature combinations. See "Control Storage Requirements under "Highlights" for detail. #7861 for first 12K increment, #7862 for second. Field Installation: Yes. Prerequisites: #7862 requires #7861.

**2314/3340 Compatibility (#8070):** Permits the emulation of 2314/2319 volumes on the 3340 Disk Storage. The user program may access both the emulated 2314 data set as well as 3340 volumes. This provides a "mixed-mode" operating environment. "Mixed-mode" is only possible with DOS releases which support 3340 on mdl 135. Maximum: One. Limitations: Cannot be installed with IFA Conversion (#4645), 2319 IFA (#4650), 3330/3340 Intermix (#9315), 3344 Attach (#9317), or String Switch Attachment (#9841). Field Installation: Yes. Prerequisites: #9314 on 3330/3340 Series IFA (#4655).

**Universal Character Set Adapter (#8637):** Permits the use of the Universal Character Set Feature on a 1403 Mdl 2 or Mdl N1 attached via the Integrated 1403 Printer Mdl 2, Mdl N1 Attachment (#4672). Maximum: One. Prerequisites: #4670, #4672. Field Installation: Yes.

**Virtual Machine Assist (#8740):** Provides assist to VS operating systems operating under VM/370 by emulation of certain privileged operations. Field Installation: Yes. Prerequisites: #2001 and #3900.

**300 bps (#9593-#9600)\*:** Allows the Terminal Adapter Type 1 Mdl II to operate at 300 bps. Specify: Refer to Table 1-C for Terminal Adapter Type I Mdl II for appropriate feature code according to the line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type 1 Mdl II.

**600 bps (#9601-#9608)\*:** Allows the Terminal Adapter Type I mdl II or the Synchronous Adapter Type II to operate at 600 bps. Specify: Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type 1 Mdl II, or Synchronous Data Adapter Type II.

**Modem Clocking (#9609-#9616):** Allows a Terminal Adapter Type III to operate at 2400 bps or a Synchronous Data Adapter Type II to operate at 2000 bps, 2400 bps, 4800 bps, or 7200 bps. Requires the appropriate clocking to be in the attached modem. It should be pointed out, however, that there are certain modems (for example, the 3872 mdl 1) which, although basically 2400 bps modems, offer a 1200 bps half-speed facility. Since the requirements for the Modem Clocking feature are defined by the type of modem, not the line speed, the Modem Clocking Feature (#9609-#9616) is still required as a prerequisite on the ICA when such modems are attached to the Synchronous Data Adapter Type II and are switched for 1200 bps operation. Specify: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type III or Synchronous Data Adapter Type II.

**Half-Duplex Facility (#9617-#9624)\*:** Required if the Synchronous Data Adapter Type II is attached to a two-wire facility. Note: This feature is not required with Switched Network (#9625-#9632) or Tributary Station (#9665-#9672). Specify: Refer to Table 1-E for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Switched Network Facility (#9625-#9632)\*:** Allows the Terminal Adapter Type I mdl II or the Synchronous Data Adapter Type II to operate over C-type switched lines. Specify: Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I mdl II, or Synchronous Data Adapter Type II.

**Connect Data Set To Line (#9633-#9640):** Required with some modems when used on switched public networks. Consult your Teleprocessing Coordinator to determine specific modems requiring this feature. Specify: Refer to Table 1C for TA-1 or Table 1E for SDA-II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: TA-I mdl II or SDA-II and switched network facility.

**Switched Speed (#9641-#9648):** Provides control of data signaling rate selection from the console printer-keyboard via the Alter/Display Function. Speed selection can be 600 or 1200 bps. Specify: Refer to Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installable: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Synchronous Data Adapter Type II (#9649-#9656)\*:** Provides control of data transfers between the 3135 and binary synchronous terminals. See "Binary Synchronous Terminals" under 2701 Data Adapter Unit. Control Station is included with this feature. Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Speed Selection: Provides operation over switched telephone network or leased, voice-grade channels at 600 bps if 600 Bits Per Second feature is specified. See above. Provides operation over leased voice-grade channels at 1200 bps (no speed need be specified). Provides operation over switched telephone network at 2000 bps if Modem Clocking is specified. See above. Provides operation over leased voice-grade lines at 7200 bps if Modem Clocking is specified. See above. Field Installation: Yes. Prerequisites: #4640.

For special requirements: See Table 1-E and features below for additional specify requirements if Half-duplex Facility, Transparency, Tributary Station, Switched Network Facility, Autocall, EON, or New Sync are required. See Table 1-E and 600 Bits Per Second (#9601-#9608) if operation at 600 bps is required. See Table 1-E and Modem Clocking below if 2000 bps, 2400 bps, 4800 bps, or 7200 bps operation is required. The appropriate Data Code feature must be specified if other than EBCDIC is required as the primary data code. See "Data Code Features" below.

Limitations: For line speed limitations, refer to "Mdl 135 Channel Characteristics Manual", GA33-3010.

**Note on Data Code Features:** The primary data code for the SDA Type II is EBCDIC. As an option to EBCDIC, either ASCII or 6-bit Transcode (2780 Data Transmission Terminal only) may be specified as the primary code. In addition to the primary data code, an alternate data code, selected under program control, may be specified for the Synchronous Data Adapter Type II. EBCDIC, ASCII, or 6-bit Transcode may be selected as an alternate code. Specify (for data code features): Refer to Table 1-E for appropriate feature codes according to line position(s) desired. Field Installation (of data code features): Yes. Prerequisites (for data code features): Synchronous Data Adapter Type II.

**Tributary Station (#9665-#9672)\*:** Required when a Synchronous Data Adapter Type II is installed and functioning as a leased communication line, as a tributary station, and not functioning as a control station. Specify: Refer to Table 1-E for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Transparency (#9673-#9680)\*:** Provides the Synchronous Data Adapter Type II with the ability to transmit and receive 8-bit binary data as well as EBCDIC or ASCII codes; or 6-bit binary data as well as 6-bit Transcode. This feature with ASCII modifies VRC/LRC checking to VRC/CRC checking. Limitation: ASCII code and Transparency cannot be installed together for the same line position when attached to the 2770, 2780, 3780, S/3 or S/7. On S/32, EBCDIC and EBCDIC Transparency are standard, and one is selected by programming. Specify: Refer to Table 1-E for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Terminal Adapter Type I Model II (#9721-#9728)\*:** Controls data transfers between the 3135 and 1050/2740 mdl 1/2741/5010 mdl Axx over facility C1 or D1, and between the 3135 and 2740 mdl 2 or 5010 mdl Axx over facility D1 or D2, and 1050/2741/2740 mdl 1 over facility

C1 or D1, and between the 3135 and 2740, 2312, or 5010 mdl AXX over facilities D1 or D2, or between the 3135 and a 3767, 5010 or 5100 over Facility M1, or between the 3135 and a 3767 or 5010 over Facility M2, or between the 3135 and a 3767 over Facility M3. Includes vertical and longitudinal checking for 1050 terminals and 2740s equipped with Record Checking (#6114). Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Special Requirements: See Table 1-C and features below for additional specify requirements if Switched Network Facility, Write Interrupt, Unit Exception Suppression, Read Interrupt, or Autocall are required. Normal operation is at 134.5 bps. 600 Bits Per Second feature must be specified for operation at 600 bps to 2740s or 5010 mdl Axx. Field Installation: Yes. Prerequisites: #4640.

**Unit Exception Suppression (#9729-#9736)\*:** If this feature is installed with Terminal Adapter Type 1 Mdl II, Unit Exception will not be set in response to a Circle C. Not supported under BTAM, QTAM or TCAM. Specify: Refer to Table 1-C for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type 1 Mdl II.

**Read Interrupt (#9737-#9744)\*:** Allows the Terminal Adapter Type I mdl II to operate with a 2741 equipped with Transmit Interrupt (#7900). Not supported under BTAM, QTAM or TCAM. Specify: Refer to Table 1-C for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type 1 Mdl II.

**Write Interrupt (#9745-#9752)\*:** Allows the Terminal Adapter Type 1 Mdl II to operate with a 2741 equipped with Receive Interrupt (#4708). Not supported under BTAM, QTAM or TCAM. Specify: Refer to Table 1-C for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type 1 mdl II.

**Terminal Adapter Type III (#9753-#9760)\*:** Controls data transfers between the 3135 and either remote 2845 Display Controls or 2848 Display Controls operating at 1200 bps over facility D5. Permits operation at 2400 bps over facility D7 if Modem Clocking is specified. Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: #4640.

**Multipoint (#9761-#9768)\*:** Specifies that a Terminal Adapter Type III is to operate in multipoint mode. If #9761-#9768 is not ordered for a given Terminal Adapter Type III, point-to-point operation is presumed. Specify: Refer to Table 1-D for appropriate feature code according to line positions desired. Prerequisites: Terminal Adapter Type III. Field Installation: Yes.

**EON (#9801-#9807)\* (Canada only):** Automatically generates an EON digit at the end of the dial sequence. Specify: Refer to Table 1E for appropriate feature code according to line position desired. Specify for 3872 with EON option. Field Installation: Yes. Prerequisites: #1290, #9649-#9656.

**New Sync (#9808-#9815)\*:** Allows Synchronous Data Adapter Type II or Terminal Adapter Type III to be connected to modems which offer the New Sync feature option and have this option installed. New Sync feature minimizes modem turn-around and allows faster bit synchronization of the following data. Specify: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: #9609-#9616 and a modem offering New Sync. Note: New Sync is not required if #9617-#9624, #9665-#9672, or #9625-#9632 is installed for the line position in question.

**Note:** \* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

**Modems:** Up to eight modems can be attached to a 3135, any mdl. Prerequisites: Integrated Communications Adapter (#4640) and Synchronous Communications Adapter Type II (#9649-#9656) 2400 bps to 7200 bps, Terminal Adapter Type 1 Mdl II (#9721-#9728) 134.5

bps to 600 bps, or Terminal Adapter Type III (#9753-#9760) 1200 bps or 2400 bps. See feature descriptions for limitations.

Modem	Speed (bps)	Facility
3976 mdl 1	up to 200	Nonswitched
3976 mdl 2	up to 200	Switched
3976 mdl 3	up to 1200	Nonswitched or Switched
3863 mdl 1 1/2	2400	Nonswitched or Switched
3872 mdl 1	2400	Nonswitched or Caducee Switched
3864 mdl 1 1/2	4800	Nonswitched or Switched
3874 mdl 1	4800	Nonswitched
3875 mdl 1	7200	Nonswitched

**Note:** For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3872, 3874, 3875, 3976.

**MES Orders:** For an MES order containing multiple features, the sequence of installation of individual features is determined at the plant of manufacture. No change to MES content or sequence can be made at installation time. If changes are required, the original MES must be cancelled and a new one originated.

## COMMUNICATION INFORMATION TABLES

Before ordering, check Special Feature write-ups for Prerequisites and Limitations.

Table 1-A Additional Line Appearances

Feature	Line Position			
	1	2	3	4
Additional Lines	4640	4722	4723	4724

Additional Lines	Line Position			
	5	6	7	8
	4725	4726	4727	4728

Specify additional lines according to line positions.

Table 1-B Terminal Adapters

Feature	Line Position			
	1	2	3	4
Terminal Adapter Type 1 mdl II	9721	9722	9723	9724
Terminal Adapter Type III	9753	9754	9755	9756
Synchronous Data Adapter Type II	9649	9650	9651	9652

Feature	Line Position			
	5	6	7	8
Terminal Adapter Type 1 mdl II	9725	9726	9727	9728
Terminal Adapter Type III	9757	9758	9759	9760
Synchronous Data Adapter Type II	9653	9654	9655	9656

Any adapter added, removed, or relocated to another line position requires reconfiguration of the entire line.

Select one terminal adapter for each line position specified in Table 1-A.

Table 1-C Options for Terminal Adapter Type 1 Model II

Feature	Line Position			
	1	2	3	4
200 bps	2711	2712	2713	2714
300 bps	9593	9594	9595	9596
600 bps	9601	9602	9603	9604
Switched Network Facility	9625	9626	9627	9628
Connect Data Set to Line	9633	9634	9635	9636
Unit Exception Suppression	9729	9730	9731	9732
Read Interrupt	9737	9738	9739	9740
Write Interrupt	9745	9746	9747	9748
Autocall (Canada only)	9777	9778	9779	9780

Feature	Line Position			
	5	6	7	8
600 bps	9605	9606	9607	9608
Modem Clocking	9613	9614	9615	9616
Half Duplex Fac.	9621	9622	9623	9624
Switched Network Facility	9629	9630	9631	9632
Connect Data Set to Line	9637	9638	9639	9640
Switched Speed	9645	9646	9647	9648
Tributary Station	9669	9670	9671	9672
Transparency	9677	9678	9679	9680
Autocall	9780	9781	9782	9783
EON	9804	9805	9806	9807
New Sync	9812	9813	9814	9815

Select features required for each line position for which Synchronous Data Adapter Type II is specified.

Optional Primary Data Codes

Feature	Line Position			
	5	6	7	8
200 bps	2715	2716	2717	2718
300 bps	9597	9598	9599	9600
600 bps	9605	9606	9607	9608
Switched Network Facility	9629	9630	9631	9632
Connect Data Set to Line	9637	9638	9639	9640
Unit Exception Suppression	9733	9734	9735	9736
Read Interrupt	9741	9742	9743	9744
Write Interrupt	9749	9750	9751	9752
Autocall (Canada only)	9780	9781	9782	9783

Feature	Line Position			
	1	2	3	4
ASCII	9681	9682	9683	9684
6-Bit Transcode*	9689	9690	9691	9692

Feature	Line Position			
	5	6	7	8
ASCII	9685	9686	9687	9688
6-Bit Transcode*	9693	9694	9695	9696

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

Optional Alternate Data Codes

Table 1-D Options For Terminal Adapter Type III

Feature	Line Position			
	1	2	3	4
Modem Clocking	9609	9610	9611	9612

Feature	Line Position			
	5	6	7	8
Modem Clocking	9613	9614	9615	9616

Select modem clocking feature for each line position for which Terminal Adapter Type III is needed and operation at 2400 bps is desired.

Table 1-E Options For Synchronous Data Adapter Type II

Feature	Line Position			
	1	2	3	4
600 bps	9601	9602	9603	9604
Modem Clocking	9609	9610	9611	9612
Half Duplex Fac.	9617	9618	9619	9620
Switched Network Facility	9625	9626	9627	9628
Connect Data Set to Line	9633	9634	9635	9636
Switched Speed	9641	9642	9643	9644
Tributary Station	9665	9666	9667	9668
Transparency	9673	9674	9675	9676
Autocall	9777	9778	9779	9780
EON	9801	9802	9803	9804
New Sync	9808	9809	9810	9811

Feature	Line Position			
	1	2	3	4
EBCDIC	9697	9698	9699	9700
ASCII	9705	9706	9707	9708
6-Bit Transcode*	9713	9714	9715	9716

Feature	Line Position			
	5	6	7	8
EBCDIC	9701	9702	9703	9704
ASCII	9709	9710	9711	9712
6-Bit Transcode*	9717	9718	9719	9720

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

\* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal.

Table 2 -- Part 1

Features Required for Start/Stop Terminals

- 1050 Data Communication System
- Modem: 3976 mdl 2
- ▲ Line Speed: 134.5 bps
- ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.

- ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Connect Data Set to line (if required).
- Modem: 3976 mdl 1
- ▲ Line Speed: 134.5 bps
- ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
- ▲ Features required: Terminal Adapter Type 1 mdl II
- 2260 Display Station mdl 1
  - Connects via 2848 Display Control mdl 3 -- see this table
- 2260 Display Station mdl 2
  - Connects via 2848 Display Control mdl 1 or 2 -- see this table
- 2265 Display Station mdl 1
  - connects via 2845 Display control mdl 1 -- see this table
- 2740 Communication Terminal mdl 1
  - Modem: 3976 mdl 2
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Connect data Set to Line (if required).
  - Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II
- 2740 Communication Terminal mdl 2
  - Modem: 3976 mdl 1
  - ▲ Line Speed 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II
  - Modem: 3976 mdl 3
  - ▲ Line Speed: 600 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
  - ▲ Features Required: Terminal Adapter Type I mdl II, 600 bps
- 2741 Communication Terminal mdl 1 (without interrupt feature)
  - Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps
  - ▲ Features Required: Terminal Adapter Type 1 mdl II
- 2741 Communication Terminal mdl 1 (with Receive Interrupt feature)
  - Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type i mdl II, Write Interrupt, Unit-Exception Suppression (if required)
- 2741 Communication Terminal mdl 1 (with Transmit Interrupt feature)
  - Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II, Read Interrupt, Unit-Exception Suppression (if required)
- 2741 Communication Terminal mdl 1 (with receive Interrupt and Transmit Interrupt features)
  - Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, Read-Interrupt, Unit-Exception Suppression (if required)
- 2760 Optical Image Unit mdl 1
  - Connects via 2740 Communication Terminal mdl 1 -- see this table
- 2845 Display Control mdl 1 Point-to-Point or Multipoint
  - Modem: 3976 mdl 3
  - ▲ Line Speed: 1200 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.
  - ▲ Features Required: Terminal Adapter Type III Multipoint for Multipoint Operations.
  - Modem: 3872 mdl 1
  - ▲ Line Speed: 2400 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
  - ▲ Features Required: Terminal Adapter Type III, Modem Clocking Multipoint for Multipoint Operation, New Sync (if required).
- 2848 Display Control mdls 1,2 and 3 Point-to-Point or Multipoint

- Modem: 3976 mdl 3
  - ▲ Line Speed: 1200 bps.
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.
  - ▲ Features Required: Terminal Adapter Type II Multipoint for Multipoint Operation.
- Modem: 3872 mdl 1
  - ▲ Line Speed: 2400 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
  - ▲ Features Required: Terminal Adapter Type III, Modem Clocking Multipoint for Multipoint Operation, New sync (if required).
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (without interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
    - ▲ Features Required: Terminal Adapter Type 1, mdl II, Switched Network Facility, 200 bps Line Speed, Connect Data Set to Line (if required)
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II 200 bps Line Speed
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 300 bps
    - ▲ Type of Communication Line Required: Code O
    - ▲ Features Required: Terminal Adapter Type 1, mdl II, Switched Data Network Facility, 300 bps Line Speed, Connect Data Set to Line (if required)
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 300 bps
    - ▲ Type of Communication Line Required: Code P
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 300 bps Line Speed
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt feature)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 200 bps Line Speed
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line control (with Transmit Interrupt feature)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1, 2, or 3 with #7112 - 2740-2 Line Control
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 600 bps.
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps -OR- Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 600 bps Line Speed
- System/7
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt and Transmit Interrupt features)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7111 - 2740-1 Line Control
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, 200 bps Line Speed, Connect Data Set to Line (if required)
  - Modem 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 200 bps Line Speed
  - Modem: 3976 mdl 3
    - ▲ Line Speed 300 bps
    - ▲ Type of Communication Required: Code P
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 300 bps Line Speed
- 3767 Communication Terminal mdl 1, 2, or 3 with #7112 - 2740-2 Line Control
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 600 bps.
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps -OR- Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 600 bps Line Speed

- ▲ Features Required: Terminal Adapter Type 1, mdl II, Switched Network Facility, Connect Data Set to Line (if required)
- Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II
- Modem: 3976 mdl 3
  - ▲ Line Speed: 600 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

**Note:** For information about the attachment of World Trade modems, refer to Table 2 - Parts 1 and 2, and to the M2700 pages.

**Table 2 -- Part 2**

**Features Required for Binary Synchronous Terminals**

- Modem: 3976 mdl 3
  - Line Speed: 600 bps
    - ▲ Manner of Line Operation: Point-to-Point
      - △ Communication Line and Modem Facilities (Nonswitched): Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.  
Features Required: Synchronous Data Adapter Type II, 600 bps, and Half Duplex Facility, Data Code features
      - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.  
Features Required: Synchronous Data Adapter Type II, 600 bps, Data Code features
      - △ Communication Line and Modem Facilities (Switched): PTT switched telephone network, with half-duplex modems, capable of operating at 600 bps.  
Features Required: Synchronous Data Adapter Type II, 600 bps, Switched Speed and Switched Network Facility, Data Code features, Connect Data Set to Line (if required)
    - ▲ Manner of Operation: Multipoint -- 3135 as Control Station
      - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.  
Features Required: Synchronous Adapter Type II, 600 bps, Data Code features
    - ▲ Manner of Line Operation: Multipoint -- 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.  
Features Required: Synchronous Data Adapter Type II, 600 bps, Tributary Station, Data Code features
- Line Speed: 1200 bps
  - ▲ Manner of Line Operation: Point-to-Point
    - △ Communication Line and Modem Facilities (Nonswitched): Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.  
Features Required: Synchronous data Adapter Type II, Half Duplex Facility, Data Code features
    - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.  
Features Required: Synchronous Data Adapter Type II, Data Code features
    - △ Communication Line and Modem Facilities (Switched): PTT switched telephone network, with half-duplex modems, capable of operating at 1200 bps.  
Features Required: Synchronous Data Adapter Type II, Switched Speed, Switched Network Facility, Data Code features, Connect Data Set to Line (if required)
  - ▲ Manner of Operation: Multipoint -- 3135 as Control Station
    - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.  
Features Required: Synchronous Data Adapter Type II, Data Code features
  - ▲ Manner of Operation: Multipoint -- 3135 as Tributary Station
    - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication line), capable of operating at 1200 bps.  
Features Required: Synchronous Data Adapter Type II, Tributary Station, Data Code features
- Modem: 3863 mdl 1, 3872 mdl 1
  - Line Speed: 2400 bps
    - ▲ Manner of Operation: Point-to-Point
      - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.  
Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

- ▲ Manner of Operation: Multipoint - 3135 as Control Station
  - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, and Data Code features, New Sync (if required)
- ▲ Manner of Operation: Multipoint - 3135 as Tributary Station
  - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code Features
- Modem: 3864 mdl 1, 3874 mdl 1
  - Line Speed: 4800 bps
    - ▲ Manner of Operation: Point-to-Point
      - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features
    - ▲ Manner of Operation: Multipoint - 3135 as Control Station
      - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features
    - ▲ Manner of Operation: Multipoint - 3135 as Tributary Station
      - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features

- Modem: 3875 mdl 1

- Line Speed: 7200 bps

- ▲ Manner of Operation: Point-to-Point
  - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 7200 bps
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code Features
- ▲ Manner of Operation: Multipoint - 3135 as Control Station
  - △ Communication Line and Modem Facilities: None Specified
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code Features
- ▲ Manner of Operation: Multipoint - 3135 as Tributary Station
  - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 7200 bps.
 

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary station, Data Code features

### MODEL CONVERSIONS

From	To	GD	GF	DH	H	HF	HG	I
FE		X	X	X	X	X	X	X
GD			X	X	X	X	X	X
GF				X	X	X	X	X
DH					X	X	X	X
H						X	X	X
HF							X	X
HG								X

Field Installable.

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3135 PROCESSING UNIT MODELS A1 - A4

(NO LONGER AVAILABLE)

The 3135-3 is NO LONGER AVAILABLE. Features and model changes can be ordered on an 'as available' basis.

### PURPOSE

Provides a performance improvement for S/370 model 135 models H, HF, HG and I only.

### MODELS A1 - A4

**Model A1\* A01:** 262,144 bytes of processor storage

**Model A2\* A02:** 327,680 bytes of processor storage

**Model A3\* A03:** 393,216 bytes of processor storage

**Model A4\* A04:** 524,288 bytes of processor storage

**Note:** The 3135-3 is available as a non-removable, field installable upgrade to a S/370 model 135 model H, HF, HG and I only.

\* A complete review by IBM is required before ordering.

**Prerequisites:** The following prerequisites apply to each 3135-3 processor mdl.

1. 3046 Power Unit. See M3046 pages.
2. Extended Precision Floating Point Feature (#3840).

### HIGHLIGHTS

Depending on the mdl, up to 524,288 bytes of processor storage are available. CPU cycle time varies from 275 to 1485 nanoseconds, depending on the internal operation being performed. Sixteen general-purpose and four floating point registers are provided.

### Standard Features:

- APL Assist
- Audible Alarm
- Byte-Oriented Operand
- 1 Byte Multiplexer Channel
- 64 Byte Multiplexer Subchannels
- Channel Command Retry
- Channel Indirect Addressing
- Clock Comparator and CPU Timer
- Conditional Swapping
- Console File
- Control Registers
- Dynamic Address Translation
- Error Checking and Correction (on Main and Control Storage)
- Extended Control Mode
- Extended Control-Program Support
- Instruction Retry
- Interval Timer
- Machine Check Handling
- OS/DOS Compatibility
- Program Event Recording
- Storage Protection (Store and Fetch)
- S/370 Universal Instruction Set (Floating Point included)
- Time of Day Clock
- PSW Key Handling.

**Control Storage:** 131,072 bytes of Reloadable Control Storage are provided for each mdl in addition to the applicable main storage. This feature permits emulator and control routines to function. Reloadable Control Storage is housed in the CPU and is loaded

from the Console file. Reloadable Control Storage is not addressable by the user.

**Virtual Storage:** Virtual Storage capability is provided to increase the effective utilization of main storage.

**Console File (standard):** This is the basic microprogram loading device for the system. The console file contains a small file device that provides all of the microcode for the system on removable magnetic disks. The several disks that will be provided with the system will supply all of the required microcode for CE diagnostics, basic system features, plus the optional features ordered for the system.

**Console Function:** Operator communications with the system is via a system control panel located on the 3135-3 and a 3210 mdl 1 or 3215 Console Printer-KeyBoard as on other mdls of the S/370 mdl 135. A right reading board extension is standard --- a left extension is not available.

### Input/Output Channels

**Byte Multiplexer Channel:** One is standard on the 3135 and is functionally equivalent to the byte multiplexer channel on S/370 mdl 135. Provides eight control unit positions in byte mode, permits simultaneous operation of many low-speed devices. Burst mode operation of unbuffered devices operating in excess of 10KB is not allowed for concurrent operation with the integrated File Adapter, the Integrated Communications Adapter, or the Block Multiplexer Channel -- see "IBM S/370 Channel Characteristics Manual", GA33-3010 for further clarification. For OS exclusion, refer to GC28-6554, "System Generation".

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Additional, in "Special Features".

**Block Multiplexer Channels:** Two are available as special features. Data rates are 1.3 megabytes per second. Permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" provides greater channel efficiency. Devices on these channels which cannot utilize block multiplexing will function as if attached to selector channels. If the 3330/3340 Series Integrated File Adapter is present these channels are addressed as 2 and 3 respectively. Otherwise they are addressed as 1 and 2.

**Subchannels:** On the byte multiplexer channel, 64 subchannels are provided as standard with the option of 128 or 256 (see "Special Features"). On each of the two available block multiplexer channels, 16 non-shared subchannels and 1 shared subchannel are provided as standard with the option of 8 non-shared and 9 shared or 8 non-shared and 5 shared (see "Special Features"). On a block multiplexer channel, a single shared subchannel may attach a control unit having a maximum of 16 device addresses.

**Note:** If Block Multiplexer Channel(s) are installed, subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. Also see Block Multiplexer Shared Subchannels in "Special Features".

### Input/Output Attachments

**Non-native:** A wide variety of I/O devices may be attached to these models of the S/370 mdl 135 via the standard byte multiplexer channel, and/or the optional block multiplexer channel(s). In particular, any device which is attachable to a 3135 is attachable to a 3135-3.

**Native:** The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices.

**Console Printer-KeyBoard:** (required) This unit serves as the online I/O device for operator/system communications. It provides a means of manually entering data into the system, altering or dis-

playing data already in storage, and for printing error logout messages.

**2319 Integrated File Adapter (#4650):** (optional) This feature enables native attachment of a 2319 Disk Storage mdl A1\*\* (and a 2319 mdl A3\*\*, 2312 mdl A1s\*\* or 2318 mdl A1\*\*) up to a total of eight drives. The IFA is addressed as channel 1. Limitation: Cannot be installed if 3333/3340 Intermix (#9315) is specified when 3330/3340 Series IFA (#4655) is also ordered.

\*\* No longer available.

**3330/3340 Series Integrated File Adapter (#4655):** (optional) This feature allows the native attachment of one or two 3333 modules or 3340 mdl A2 units. Each 3333 module (either mdl 1 or mdl 11) can attach up to three 3330 modules (any combination of mdls 1, 2 or 11). Each 3340 mdl A2 can attach 3340 mdl B2 or B1 units, and one 3340 mdl A2 can also attach 3344 units to a maximum of eight drives. Maximum is sixteen drives per IFA. If 2319 IFA (#4650) is also present, IFA Conversion (#4645) is required.

**Integrated Communications Adapter (#4640):** (optional) This feature provides attachment of up to eight teleprocessing lines to the 3135-3. These may be any combination of supported BSC and Start/Stop lines and appear to the processor as if connected via one or more 2701s on the byte multiplexer channel.

**Integrated Printer Adapter:** (optional) This feature enables native attachment of a 1403 Printer mdl 2, 7 or N1. The Universal Character Set Feature can be optionally specified on the 1403 mdl 2 or N1.

## Programming Features

**APL Assist:** (standard) This feature is an APL emulator. It replaces functions performed by the APL software interpreter. This feature can provide a performance improvement for many APL applications when used with VS APL (5748-AP1).

**Conditional Swapping:** (standard) Provides two additional instructions --- Compare and Swap --- Compare Double and Swap

**PSW Key Handling:** (standard) Provides two additional instructions --- Insert PSW Key --- Det PSW Key from Address.

**Extended Control Program Support:** (standard) The 3135-3 processor mdls of the S/370 mdl 135 include Extended Control Program Support. This is a hardware assist that reduces the CPU time needed to execute certain frequently used supervisor functions in both VS1 and VM/370.

The functional areas for VM/370 include:

- Virtual Machine I/O
- Storage Management
- Page Management
- SVC Handler
- Privileged Instruction Interfaces
- Dispatching
- Virtual Interval Timer

For VS1 the functional areas are:

- Storage Management
- IOS
- SVC FLIH
- System Trace
- Page Management

**Publications:** GC20-0001

## SPECIFY

- Power (AC, 3-phase, 4-wire, 50/60 Hz): See GI Section 12 for voltage specify feature numbers. Note: 200V (#2807, #2733) not available.
- Order the Online Test System (OLTS) for your customer's configuration as required: Initially, or when being modified.

The ordering procedure will be found in the WT Instruction Manual, section 2-11.

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Cabling: #9080 for below the floor; #9081 for on the floor.
- Console Printer Keyboard Address: Recorded on console logic disk at the plant #9101\* for "01F" or #9102\* for "009".

\* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in a S/370 mdl 135.
- Console Printer-Keyboard: A 3210 mdl 1 or 3215 is required in every system. See M3210, 3215 pages "Special Features" below.

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

- Control Panel Language Groups:

English	#2927
French	#2928
German	#2929

- Keyboard and Printer Language Groups (must be specified on 3135 for the 3210 and 3215):

Austrian/German	#2957
Belgian/French	#2964
Danish	#2965
English UK	#2958
English US	#2956
Finnish/Swedish	#2963
Italian	#2968
Norwegian	#2966
Portuguese	#2959
Spanish	#2961

All are diskette - only features.

- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3135 Frame 01 (CPU) are 31-1/2 inches wide x 70 inches long x 60 inches high. Removal of the side covers will reduce the width to 29-1/2 inches. If further reduction in length is required, specify #9570. Shipping dimensions will then be 29-1/2 inches wide x 60 inches long x 60 inches high.

## SPECIAL FEATURES

**AUTOCALL (#1290):** (Canada only) Provides automatic calling capabilities on on facilities C1, C2, C3, C4, C5 or C6 to initiate (dial), through stored program control, a data link to a remote station. For the appropriate calling units, see M2700 pages. Specify: Refer to Table 1C for Terminal Adapter Type I Mdl II or Table 1E for Synchronous Data Adapter Type II for appropriate feature code according to line positions desired. Limitations: Each Autocall feature installed reduces the number of lines available on the ICA by one. Autocall must be ordered once for each line where the function is desired. Thus, the ICA can accommodate a maximum of four lines if each of these lines also has the Autocall feature. A single Autocall feature can be associated with any of the lines from one to seven. Cable Order: Required. Maximum: Four. This feature must be ordered only once for each line position required. Prerequisites: #9721-#9728 or #9649-#9656; and #9625-#9632. Field Installation: Yes.

**Block Multiplexer Channel (#1425, #1426):** Each adds a block multiplexer channel with 16 non-shared subchannels and 1 shared

selector subchannel to the system. #1425 first --- #1426 second. If the 3330/3340 Series Integrated File Adapter is present these channels are addressed as 2 and 3 respectively. Otherwise they are addressed as 1 and 2. Field Installation: Yes. Prerequisites: #1426 requires #1425.

**Block Multiplexer Shared Subchannel (#1431):** (Note: This feature should only be installed if devices capable of "Block Shared" operation are installed on the block multiplexer channel. See "I/O Configuration Form", GA22-7002.)

Allows any one of the following combinations of "Non-Shared", "Block Shared", or selector subchannels to be attached to the Block Multiplexer Channel (#1421): (1) 16 non-shared and one shared selector (see "Address Restrictions") --- (2) 8 non-shared, 8 block shared, and 1 shared selector (see "Address Restrictions") --- (3) 8 non-shared, 4 block shared, 1 shared selector (see "Address Restrictions"). If option (2) is selected, then each block shared subchannel may have attached to it a control unit having a maximum of 16 device addresses. If option (3) is selected, the four block shared subchannels may each have attached a control unit having a maximum of 32 device addresses. If option (1) is selected, no block shared subchannels are available, and addresses X00 through X7F are not available. With any option, the selector subchannel may have attached to it control units with a maximum of 16 device addresses. This feature will apply to both selector channels if installed. The options are selectable by the Customer Engineer and may be defined differently on each channel. Maximum: One. Field Installation: Yes. Prerequisites: #1421.

#### Address Restrictions with #1431:

- Addresses X00 through X7F are assigned as block shared subchannels. With option (1), they may not be used. With option (2), each control unit address position, i.e., X00, X10, X20, etc., through X70 is available. With option (3), "even" control unit address positions only are available, i.e., 00, 20, 40 and 60.
- Selector and non-shared addresses are limited to addresses X80 through XFF.

**Channel Priority (#1501):** When the IFA (#4650 or #4655) and both selector channels are present, this feature changes the higher priority for command chaining from the first selector channel (Channel 2) to the second selector channel (Channel 3). #1501 is required if any DASD devices are to be attached to Channel 3. Field Installation: Yes. Prerequisites: #4650 or #4655 and both #1425 and #1426.

**200 Bits Per Second (#2711-#2718):** Allows the Specify: Refer to Table 1-C for appropriate feature code according to the line positions desired. Prerequisites: Terminal Adapter Type 1 Mdl II. Field Installation: Yes.

**OCR Multifont (#2989):** Permits the execution of the Multifont Preprocessor programming support. The programming support, in turn, provides a means of translating input data produced by the Multifont Preprocessor feature of the 1287 mdl 5 and the 1288 mdl 1 to EBCDIC characters. Field-Installation: Yes. Prerequisites: Terminal Adapter Type 1 Mdl III.

**Direct Control (#3274):** Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes, between two cable-connected processing units, or cable-connected processing unit and external devices. Maximum: One. Cable Order: Required. Field Installation: Yes. Prerequisites: External devices must meet the interface specifications outlined in "S/360 Direct Control Feature-OEMI", GA22-6845.

**Emergency Power-Off Control (#3621, #3622):** To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see "S/370 Installation Manual - Physical Planning", GC22-7004. Field Installation: Yes.

**Extended Precision Floating Point (#3840):** Extends the precision of floating point instructions to 28 hexadecimal digits. Field Installation: Yes. Prerequisites: #3900.

**Multiplexer Subchannels, Add'l (#3906-#3907):** To increase the number of I/O devices on the byte multiplexer channel, the number of subchannels can be increased by specifying one of the following: #3906 for 128 subchannels, #3907 for 256 subchannels. The maximum number of shared subchannels is eight. When 256 subchannels are installed, there are no shared subchannels. Also see "Byte Multiplexer Channel" under "Input/Output Channels" above. Note: The number of subchannels ordered must be equal to or greater than the device addresses. Field Installation: Yes.

**1401/1440/1460 Compatibility (#4457):** Microprogrammed controlled feature, which, in combination with special software, permits the system to execute 1401/1440/1460 instructions. Field Installation: Yes.

**Integrated Communications Adapter (#4640):** Provides the circuits and controls for direct attachment of up to eight teleprocessing lines to the 3135. The controls for the first line adapter are included in this feature. Lines can be any combination of Start/Stop or BSC. Provides for the attachment of 1050, 2260 mdl 1, 2260 mdl 2, 2265 mdl 1, 2740 mdl 1, 2740 mdl 2, 2741 mdl 1, 2760 mdl 1, 5010 AXX, or any IBM computer, multiplexer, or terminal conforming to the Binary Synchronous Communications (BSC) standard. Note: In addition to the appropriate adapter, each communication line attached to the system requires an external modem. Refer to Table 2 below to define customer configuration requirements prior to ordering features below. Customer Responsibilities: See M2700 pages for customer responsibilities regarding communication facilities and servicing requirements. Communications Facilities: See M2700 pages for communication facility requirements with this feature. Field Installation: Yes.

See "Specify Requirements for Integrated Communication Adapter" under "Specify".

**IFA Conversion (#4645):** Permits co-residence of both 2319 IFA (#4650) and 3330/3340 Series IFA (#4655). Both IFAs are addressed as Channel 1. Limitations: Cannot be installed if 3333/3340 Intermix (#9315) or 3344 Attach (#9317) is specified. Cannot be installed with 2314/3340 Compatibility Feature (#8070). Maximum: One per 3135. Prerequisites: #4650 and #4655. Field Installation: Yes.

**2319 Integrated File Adapter (#4650):** Permits native attachment of a 2319 Disk Storage mdl A1 (and a 2319 mdl A3, 2312 mdl A1, or 2318 mdl A1) up to a total of eight drives. Standard features include file scan and record overflow functions. The IFA is always addressed as channel 1. Note: 2312 mdl A1s, 2318 mdl A1s and 2319 all mdls are no longer available. Limitations: Cannot be installed if 3333/3340 Intermix (#9315) is specified. Cannot be installed with 2314/3340 Compatibility (#8070). Maximum: One per 3135. Prerequisites: #4645 is required if installed with 3330 or 3340 Series IFA (#4655). Field Installation: Yes.

**3330/3340 Series Integrated File Adapter (#4655):** Permits native attachment of up to two 3333s or 3340 mdl A2s. A maximum of 16 3330 or 3340 Series drives may be attached to the IFA. The IFA supports rotational position sensing, disconnected command chaining, and multiple requesting. Record overflow is standard. For 3330, standard I/O addresses are (hex) 150 through 15F. For 3340, standard addresses are (hex) 1C0 through 1CF. For 3340 with 3344 standard addresses are (hex) 1C0 through 1E1. Maximum: One. Prerequisites: #4645 is required if installed with 2319 IFA (#4650). Field Installation: Yes. Note: 2319 all mdls are no longer available.

#### SPECIFY

- DASD Designation. Specify ONE of the following: #9313\* (DASD 3333/3330) to attach up to two 3333 mdl 1s, each with up to three 3330 mdls 1, 2 in any combination. #9314\* (DASD 3340 only) to attach up to two 3340 mdl A2s, each with up to three 3340 mdls B1, B2 in any combination. #9315\* (3333/3340

Intermix) to attach one 3333 mdl 1 (with up to three 3330 mdls 1, 2 in any combination) plus one 3340 mdl A2 (with up to three 3340 mdls B1, B2 in any combination). #9315 cannot be installed with IFA Conversion Feature (#4645).

\* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

- If any 3333 mdl 11 and/or 3330 mdl 11 is to be attached, also specify #9316\* (3333/3330 mdl 11) in addition to #9313 or #9315.

With #9313 plus #9316 a mixture of one 3333 mdl 1 and one 3333 mdl 11, each with up to three 3330 mdls 1, 2 and 11 (in any combination) can be attached, or two 3333 mdl 11s, each with any mixture of up to three 3330 mdls 1, 2 and 11.

With #9315 plus #9316, one 3333 (either mdl 1 or mdl 11) with up to three 3330 mdls 1, 2 and 11 (in any combination) can be attached in addition to one 3340 mdl A2 with up to three associated mdls B1, B2. The standard addresses with #9315 for 3330 are (hex) 150 through 157, for 3340 are (hex) 158 through 15F.

- If any 3344 is to be attached, specify #9317\* in addition to #9314 (#9317 and #9315 are mutually exclusive). #9190\* must also be specified if 3344 mdl B2Fs or the 3340 Fixed Head Feature (#4301, #4302) is ordered.

With #9314, #9317 and #9190 up to three 3344 mdl B2/B2F and/or 3340 mdl B2, B1 units in any combination can be attached to one 3340 mdl A2. The second 3340 mdl A2 if present can attach up to three 3340 mdl B1/B2 units.

#9317 is mutually exclusive with IFA Conversion Feature (#4645) and with 2314/3340 Compatibility Feature (#8070).

- When just #9314 is specified, also specify 3340 Address Designation: #9820\* for addresses (hex) 1C0 through 1CF, or #9821\* for addresses (hex) 160 through 16F. The specification of 160 allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFAs.
- When #9314 or #9315 is specified, also specify #9190\* (Fixed Head Attachment) if Fixed Head Feature (#4301, #4302) is ordered for any 3340 attached to the IFA.
- If String Switch (#8150) is ordered for any attached 3333 or 3340 mdl A2, specify String Switch Attachment (#9841)\*.
- When #9821\* is specified in conjunction with #9813 the addresses for the 3333/3330s are (HEX) 160 through 16F.
- When #9821\* is specified and both #9314 and #9317 are specified the addresses for the 3340/3344s are as follows:

	3340 A2		3344 B2/B2Fs					
	*-----*		*-----*					
S t r i n g  O P h y s i c a l  D r i v e	160	161	162	163	164	165	166	167
	*-----*							
			172	173	174	175	176	177
			1E2	1E3	1E4	1E5	1E6	1E7
			1F2	1F3	1F4	1F5	1F6	1F7
	*-----*		*-----*		*-----*		*-----*	
	Physical Drive							
	0	1	2	3	4	5	6	7

**Note 1:** The DASD control combinations that can be attached to the 3330/3340 Series IFA (#4655) are shown in the left hand column of the table below. From Section A of the table select one of the fea-

ture numbers shown (one and only one must be selected). From Section B select the feature number(s) required to support your configuration (select none, one, or more than one from Section B). Section C of the table shows the addresses available. The specification of the (hex) 160 addresses allows the 3135 IFA addresses to coincide with those of the 3115 and 3125 IFA. Select a number from Section C if required.

**Note 2:** Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.

## 3135 3330/3340 IFA (#4655)

S e c t.	DASD Control Combinations on IFA (#4655)	3333 Disk Stor Cntrl	3333/ 3340 Inter -mix	3340 Dir Access Storage Facility
A	DASD Designation, one req'd	#9313 +	#9315 +	#9314+
B	If any 3333 11 and/or 3330 mdl 11	#9316 +	#9316 +	
	3344	-	-	#9317+
	3344 mdl B2F	-	-	#9317+ + #9190+
	Fixed Head Feature (#4301/4302) on 3340	-	#9190 +	#9190+
	String Switch (#8150) on 3333/3340	#9841 +	#9841 +	#9841+
	3214/3340 Compatibil- ity Feature (see #8070)	-	-	** #8070
	3330/3340 Supports RPS Disconnected Command Chaining Multiple Re- questing if Block MPX #1421 installed	#1421	#1421	#1421
	2319 IFA (#4650)	#4645	-	*** #4645
C	Standard	*Hex 150- 15F	*3330 150- 157, 3340 Hex 158- 15F	#9820 +, not Hex 1C0- 1CF
A d d r e s	Address 160	#9821	-	#9821 See

S	+	Hex	+	Item
e		160-	not	8
S		16F	3344	a-
			Hex	bove
			160-	
			16F	

\* No feature number required.

\*\* Mutually exclusive with String Switch #9841, 2319 IFA (#4650), IFA Conversion feature (#4645), 3344 Attachment (#9317).

\*\*\* Mutually exclusive with 3344 Attachment (#9317) and 2314/3340 Compatibility (#8070).

+ CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

**Integrated Printer Adapter Basic Control (#4670):** Provides the power supply and basic control for a natively attached 1403 Printer. The standard address is '00E'. Specify: #9485\* if optional address of '00F' is desired. Maximum: One. Field Installation: Yes.

See table below for corresponding voltages for 50 Hz:

CPU	1403
220V	220V
235V	220V
380V	380V
408V	408V

Note: If the optional addresses of '01F' for the Console Printer Keyboard (#3210 or #3215) and '00F' for the integrated 1403 are both used, Multiplexer Subchannels, Add'l (#3905) must be specified.

**Integrated 1403 Printer Mdl 2/Mdl N1 Attachment (#4672):** Provides control for attaching 1403 mdl 2 or mdl N1. Specify: #9182\* to attach 1403 mdl 2, #9188\* to attach 1403 mdl N1. Maximum: One. Prerequisites: #4670. On the 1403, #9709 and #9725 is required on a mdl 2; #9726 is required on a mdl N1. See "Specify" under 1403. Field Installation: Yes.

**Integrated 1403 Printer Mdl 7 Attachment (#4677):** Provides control for attaching 1403 mdl 7. Maximum: One. Prerequisites: #4670. On the 1403, #9725 is required on a mdl 7. See "Specify" under 1403. Field Installation: Yes.

**Additional Lines (#4722-#4728):** Each provides circuits and controls for attachment of an additional line adapter, for a total of eight lines in the system. Specify: Order additional lines according to line position required. See Table 1-A. Each line specified requires the next lower order line as a prerequisite. Maximum: One of each (#4722 through #4728). Field Installation: Yes. Prerequisites: #4640.

**Specify Requirements For Integrated Communications Adapter:** For each line (#4722-#4728) attached to the ICA, including the first line included in #4640, one of the following line adapters must be specified: Terminal Adapter Type I Mdl II (#9721-#9728), Terminal Adapter Type III (#9753-#9760), or Synchronous Data Adapter Type II (#9649-#9656). Each line adapter and all associated features must be specified according to the line position to which they correspond. Refer to Table 2 below prior to ordering features for the ICA. For limitations of ICA line speeds, refer to "135 Channel Characteristics", GA33-3010.

**S/360 Mdl 20 Compatibility (#7520):** Microprogram-controlled feature, which, in combination with special software, permits the system to execute S/360 mdl 20 or S/360 mdl 25 in mdl 20 mode instructions. Field Installation: Yes.

**3210 Mdl 1 Adapter (#7844):** To attach a 3210 Console Printer-KeyBoard mdl 1 (15.5 cps) for systems console I/O; includes an alter-display ability. Maximum: One. Limitations: Cannot be installed with 3215 Adapter (#7855). Field Installation: Yes. Pre-

requisites: Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

**3215 Adapter (#7855):** To attach a 3215 Console Printer-KeyBoard (85 cps) for system console I/O; includes alter-display ability. Maximum: One. Limitations: Cannot be installed with 3210 mdl 1 Adapter (#7844). Field Installation: Yes. Prerequisites: Uses one address on the standard byte multiplexer channel, but does not use a control unit position. See "Specify."

**2314/3340 Compatibility (#8070):** Permits the emulation of 2314/2319 volumes on the 3340 Disk Storage. The user program may access both the emulated 2314 data set as well as 3340 volumes. This provides a "mixed-mode" operating environment. "Mixed-mode" is only possible with DOS releases which support 3340 on mdl 135. Maximum: One. Limitations: Cannot be installed with IFA Conversion (#4645), 2319 IFA (#4650), 3330/3340 Intermix (#9315), 3344 Attach (#9317), or String Switch Attachment (#9841). Field Installation: Yes. Prerequisites: #9314 on 3330/3340 Series IFA (#4655).

**Universal Character Set Adapter (#8637):** Permits the use of the Universal Character Set Feature on a 1403 Mdl 2 or Mdl N1 attached via the Integrated 1403 Printer Mdl 2, Mdl N1 Attachment (#4672). Maximum: One. Prerequisites: #4670, #4672. Field Installation: Yes.

**300 Bits Per Second (#9593-#9600)\*:** Allows the Terminal Adapter Type I Mdl II to operate at 300 bps. Specify: Refer to Table 1-C for Terminal Adapter Type I Mdl II for appropriate feature code according to the line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I Mdl II.

**600 Bits Per Second (#9601-#9608)\*:** Allows the Terminal Adapter Type I mdl II or the Synchronous Adapter Type II to operate at 600 bps. Specify: Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I Mdl II, or Synchronous Data Adapter Type II.

**Modem Clocking (#9609-#9616):** Allows a Terminal Adapter Type III to operate at 2400 bps or a Synchronous Data Adapter Type II to operate at 2000 bps, 2400 bps, 4800 bps or 7200 bps. Requires the appropriate clocking to be in the attached modem. It should be pointed out, however, that there are certain modems (for example, the 3872 mdl 1) which, although basically 2400 bps modems, offer a 1200 bps half-speed facility. Since the requirements for the Modem Clocking feature are defined by the type of modem, not the line speed, the Modem Clocking Feature (#9609-#9616) is still required as a prerequisite on the ICA when such modems are attached to the Synchronous Data Adapter Type II and are switched for 1200 bps operation. Specify: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type III or Synchronous Data Adapter Type II.

**Half-Duplex Facility (#9617-#9624)\*:** Required if the Synchronous Data Adapter Type II is attached to a two-wire facility. Note: This feature is not required with Switched Network (#9625-#9632) or Tributary Station (#9665-#9672). Specify: Refer to Table 1-E for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Switched Network Facility (#9625-#9632)\*:** Allows the Terminal Adapter Type I mdl II or the Synchronous Data Adapter Type II to operate over C-type switched lines. Specify: Refer to Table 1-C for Terminal Adapter Type I mdl II or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I mdl II, or Synchronous Data Adapter Type II.

**Connect Data Set To Line (#9633-#9640):** Required with some modems when used on switched public networks. Consult your Teleprocessing Coordinator to determine specific modems requiring this feature. Specify: Refer to Table 1-C for TA-1 or Table 1-E for SDA-II for appropriate feature code according to line position(s)

desired. Field-Installation: Yes. Prerequisites: TA-I mdl II or SDA-II and switched network facility.

**Switched Speed (#9641-#9648):** Provides control of data signaling rate selection from the console printer-keyboard via the Alter/Display Function. Speed selection can be 600 or 1200 bps. Specify: Refer to Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Synchronous Data Adapter Type II (#9649-#9656)\*:** Provides control of data transfers between the 3135 and binary synchronous terminals. See "Binary Synchronous Terminals" under 2701 Data Adapter Unit. Control Station is included with this feature. Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Speed Selection: Provides operation over switched telephone network or leased, voice-grade channels at 600 bps if 600 Bits Per Second feature is specified. See above. Provides operation over leased voice-grade channels at 1200 bps (no speed need be specified). Provides operation over switched telephone network at 2000 bps if Modem Clocking is specified. See above. Provides operation over leased voice-grade 7200 bps if Modem Clocking is specified. See above. Field Installation: Yes. Prerequisites: #4640.

For special requirements: See Table 1-E and features below for additional specify requirements if Half-duplex Facility, Transparency, Tributary Station, Switched Network Facility, Autocall, EON, or New Sync are required. See Table 1-E and 600 Bits Per Second (#9601-#9608) if operation at 600 bps is required. See Table 1-E and Modem Clocking below if 2000 bps, 2400 bps, 4800 bps or 7200 bps operation is required. The appropriate Data Code feature must be specified if other than EBCDIC is required as the primary data code. See "Data Code Features" below.

Limitations: For line speed limitations, refer to "Mdl 135 Channel Characteristics Manual", GA33-3010.

**Note on Data Code Features:** The primary data code for the SDA Type II is EBCDIC. As an option to EBCDIC, either ASCII or 6-bit Transcode (2780 Data Transmission Terminal only) may be specified as the primary code. In addition to the primary data code, an alternate data code, selected under program control, may be specified for the Synchronous Data Adapter Type II. EBCDIC, ASCII, or 6-bit Transcode may be selected as an alternate code. Specify (for data code features): Refer to Table 1-E for appropriate feature codes according to line position(s) desired. Field Installation (of data code features): Yes. Prerequisites (for data code features): Synchronous Data Adapter Type II.

**Tributary Station (#9665-#9672)\*:** Required when a Synchronous Data Adapter Type II is installed and functioning as a leased communication line, as a tributary station, and not functioning as a control station. Specify: Refer to Table 1-E for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Transparency (#9673-#9680)\*:** Provides the Synchronous Data Adapter Type II with the ability to transmit and receive 8-bit binary data as well as EBCDIC or ASCII codes; or 6-bit binary data as well as 6-bit Transcode. This feature with ASCII modifies VRC/LRC checking to VRC/CRC checking. Limitation: ASCII code and Transparency cannot be installed together for the same line position when attached to the 2770, 2780, 3780, S/3 or S/7. On S/32, EBCDIC and EBCDIC Transparency are standard, and one is selected by programming. Specify: Refer to Table 1-E for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Terminal Adapter Type I Mdl II (#9721-#9728)\*:** Controls data transfers between the 3135 and 1050/2741/2740 mdl 1 over facility C1 or D1, and between the 3135 and 2740, 2312, or 5010 mdl AXX over facilities D1 or D2, or between the 3135 and a 3767 or 5100 over Facility M1, or between the 3135 and a 3767 or 5010 over Facility M2, or between the 3135 and a 3767 over Facility M3. Includes vertical and longitudinal checking for 1050 terminals and 2740s equipped with Record Checking (#6114). Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Special

Requirements: See Table 1-C and features below for additional specify requirements if Switched Network Facility, Write Interrupt, Unit Exception Suppression, Read Interrupt, or Autocall are required. Normal operation is at 134.5 bps. 600 Bits Per Second feature must be specified for operation at 600 bps to 2740s or 5010 mdl AXX. Field Installation: Yes. Prerequisites: #4640.

**Unit Exception Suppression (#9729-#9736)\*:** If this feature is installed with Terminal Adapter Type I Mdl II, Unit Exception will not be set in response to a Circle C. Not supported under BTAM, QTAM or TCAM. Specify: Refer to Table 1-C for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I Mdl II.

**Read Interrupt (#9737-#9744)\*:** Allows the Terminal Adapter Type I mdl II to operate with a 2741 equipped with Transmit Interrupt (#7900). Not supported under BTAM, QTAM or TCAM. Specify: Refer to Table 1-C for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I Mdl II.

**Write Interrupt (#9745-#9752)\*:** Allows the Terminal Adapter Type I Mdl II to operate with a 2741 equipped with Receive Interrupt (#4708). Not supported under BTAM, QTAM or TCAM. Specify: Refer to Table 1-C for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type I mdl II.

**Terminal Adapter Type III (#9753-#9760)\*:** Controls data transfers between the 3135 and either remote 2845 Display Controls or 2848 Display Controls operating at 1200 bps over facility D5. Permits operation at 2400 bps over facility D7 if Modem Clocking is specified. Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: #4640.

**Multipoint (#9761-#9768)\*:** Specifies that a Terminal Adapter Type III is to operate in multipoint mode. If #9761-#9768 is not ordered for a given Terminal Adapter Type III, point-to-point operation is presumed. Specify: Refer to Table 1-D for appropriate feature code according to line positions desired. Prerequisites: Terminal Adapter Type III. Field Installation: Yes.

**EON (#9801-#9807)\* (Canada only):** Automatically generates an EON digit at the end of the dial sequence. Specify: Refer to Table 1E for appropriate feature code according to line position desired. Specify for 3872 with EON option. Field Installation: Yes. Prerequisites: #1290, #9649-#9656.

**New Sync (#9808-#9815)\*:** Allows Synchronous Data Adapter Type II or Terminal Adapter Type III to be connected to modems which offer the New Sync feature option and have this option installed. New Sync feature minimizes modem turn-around and allows faster bit synchronization of the following data. Specify: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: #9609-#9616 and a modem offering New Sync. Note: New Sync is not required if #9617-#9624, #9665-#9672, or #9625-#9632 is installed for the line position in question.

**Modems:** Up to eight modems can be attached to a 3135, any mdl. Prerequisites: Integrated Communications Adapter (#4640) and Synchronous Communications Adapter Type II (#9649-#9656) 2400 bps to 7200 bps, Terminal Adapter Type I Mdl II (#9721-#9728) 134.5 bps to 600 bps, or Terminal Adapter Type III (#9753-#9760) 1200 bps or 2400 bps. See feature descriptions for limitations.

Modem	Speed (bps)	Facility
3976 mdl 1	up to 200	Nonswitched
3976 mdl 2	up to 200	Switched
3976 mdl 3	up to 1200	Nonswitched or Switched
3863 mdl 1/2	2400	Nonswitched or Switched
3872 mdl 1	2400	Nonswitched or Caducee

3864 mdl 1/2	4800	Switched
		Nonswitched
3874 mdl 1	4800	or Switched
3875 mdl 1	7200	Nonswitched
		Nonswitched

Note: For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3872, 3874, 3875, 3976.

**MES Orders:** For an MES order containing multiple features, the sequence of installation of individual features is determined at the plant of manufacture. No change to MES content or sequence can be made at installation time. If changes are required, the original MES must be cancelled and a new one originated.

## Communication Information Tables

Before ordering, check Special Feature write-ups for Prerequisites and Limitations.

\* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. There is a fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

Table 1-A Additional Line Appearances

	Line Position			
Feature	1	2	3	4
Additional Lines	4640	4722	4723	4724

	Line Position			
Feature	5	6	7	8
Additional Lines	4725	4726	4727	4728

Specify additional lines according to line positions.

Table 1-B Terminal Adapters

	Line Position			
Feature	1	2	3	4
Terminal Adapter Type 1 mdl II	9721	9722	9723	9724
Terminal Adapter Type III	9753	9754	9755	9756
Synchronous Data Adapter Type II	9649	9650	9651	9652

	Line Position			
Feature	5	6	7	8
Terminal Adapter Type 1 mdl II	9725	9726	9727	9728
Terminal Adapter Type III	9757	9758	9759	9760
Synchronous Data Adapter Type II	9653	9654	9655	9656

Any adapter added, removed, or relocated to another line position requires reconfiguration of the entire line.

Select one terminal adapter for each line position specified in Table 1-A.

Table 1-C Options For Terminal Adapter Type 1 Mdl II

	Line Position			
Feature	1	2	3	4

200 bps	2711	2712	2713	2714
300 bps*	9593	9594	9595	9596
600 bps*	9601	9602	9603	9604
Switched Network Facility*	9625	9626	9627	9628
Connect Data Set to Line	9633	9634	9635	9636
Unit Exception Suppression*	9729	9730	9731	9732
Read Interrupt*	9737	9738	9739	9740
Write Interrupt*	9745	9746	9747	9748
Autocall (Canada only)	9777	9778	9779	9780

	Line Position			
Feature	5	6	7	8
200 bps	2715	2716	2717	2718
300 bps*	9597	9598	9599	9600
600 bps*	9605	9606	9607	9608
Switched Network Facility*	9629	9630	9631	9632
Connect Data Set to Line	9637	9638	9639	9640
Unit Exception Suppression*	9733	9734	9735	9736
Read Interrupt*	9741	9742	9743	9744
Write Interrupt*	9749	9750	9751	9752
Autocall (Canada only)	9781	9782	9783	

Table 1-Options For Terminal Adapter Type III

	Line Position			
Feature	1	2	3	4
Modem Clocking	9609	9610	9611	9612
Multipoint*	9761	9762	9763	9764
New Sync*	9808	9809	9810	9811

	Line Position			
Feature	5	6	7	8
Modem Clocking	9613	9614	9615	9616
Multipoint*	9765	9766	9767	9768
New Sync*	9812	9813	9814	9815

Select modem clocking feature for each line position for which Terminal Adapter Type III is needed and operation at 2400 bps is desired. Table 1-E Options For Synchronous Data Adapter Type II

	Line Position			
Feature	1	2	3	4
600 bps*	9601	9602	9603	9604
Modem Clocking	9609	9610	9611	9612
Half Duplex Fac.*	9617	9618	9619	9620
Switched Network Facility*	9625	9626	9627	9628
Connect Data Set to Line	9633	9634	9635	9636
Switched Speed	9641	9642	9643	9644
Tributary Station*	9665	9666	9667	9668
Transparency*	9673	9674	9675	9676
Autocall	9777	9778	9779	9780
EON*	9801	9802	9803	9804
New Sync*	9808	9809	9810	9811

	Line Position			
Feature	5	6	7	8

600 bps*	9605	9606	9607	9608
Modem Clocking	9613	9614	9615	9616
Half Duplex Fac.*	9621	9622	9623	9624
Switched Network Facility*	9629	9630	9631	9632
Connect Data Set to Line	9637	9638	9639	9640
Switched Speed	9645	9646	9647	9648
Tributary Station*	9669	9670	9671	9672
Transparency*	9677	9678	9679	9680
Autocall	9781	9782	9783	
EON*	9805	9806	9807	
New Sync*	9812	9813	9814	9815

Select features required for each line position for which Synchronous Data Adapter Type II is specified.

### Optional Primary Data Codes

Feature	Line Position			
	1	2	3	4
ASCII	9681	9682	9683	9684
6-Bit Transcode *	9689	9690	9691	9692

Feature	Line Position			
	5	6	7	8
ASCII	9685	9686	9687	9686
6-Bit Transcode *	9693	9694	9695	9696

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

\* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal.

### Optional Alternate Data Codes

Feature	Line Position			
	1	2	3	4
EBCDIC	9697	9698	9699	9700
ASCII	9705	9706	9707	9708
6-Bit Transcode *	9713	9714	9715	9716

Feature	Line Position			
	5	6	7	8
EBCDIC	9701	9702	9703	9704
ASCII	9709	9710	9711	9712
6-Bit Transcode *	9717	9718	9719	9720

Select one of the above data codes if required in lieu of EBCDIC for each line position for which Synchronous Data Adapter Type II is specified.

\* 6-Bit Transcode can be used only with a 2780 Data Transmission Terminal.

Table 2 -- Part 1

### Features Required for Start/Stop Terminals

- 1050 Data Communication System
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Connect Data Set to line (if required)

- Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features required: Terminal Adapter Type 1 mdl II

- 2260 Display Station mdl 1
  - Connects via 2848 Display Control mdl 3 -- see this table
- 2260 Display Station mdl 2
  - Connects via 2848 Display Control mdl 1 or 2 -- see this table
- 2265 Display Station mdl 1
  - connects via 2845 Display control mdl 1 -- see this table
- 2740 Communication Terminal mdl 1

- Modem: 3976 mdl 2
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Connect data Set to Line (if required)
- Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II

- 2740 Communication Terminal mdl 2

- Modem: 3976 mdl 1
  - ▲ Line Speed 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II
- Modem: 3976 mdl 3
  - ▲ Line Speed: 600 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
  - ▲ Features Required: Terminal Adapter Type I mdl II, 600 bps

- 2741 Communication Terminal mdl 1 (without interrupt feature)
  - Modem: 3976 mdl 1

- ▲ Line Speed: 134.5 bps
- ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps

- ▲ Features Required: Terminal Adapter Type 1 mdl II
- 2741 Communication Terminal mdl 1 (with Receive Interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
    - ▲ Features Required: Terminal Adapter Type I mdl II, Write Interrupt, Unit-Exception Suppression (if required)
- 2741 Communication Terminal mdl (with Transmit Interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Read Interrupt, Unit-Exception Suppression (if required)
- 2741 Communication Terminal mdl 1 (with receive Interrupt and Transmit Interrupt features)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, Read-Interrupt, Unit-Exception Suppression (if required)
- 2760 Optical Image Unit mdl 1
  - Connects via 2740 Communication Terminal mdl 1 -- see this table
- 2845 Display Control mdl 1 Point-to-Point or Multipoint
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 1200 bps
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.
    - ▲ Features Required: Terminal Adapter Type III Multipoint for Multipoint Operations
  - Modem: 3872 mdl 1
    - ▲ Line Speed: 2400 bps
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
    - ▲ Features Required: Terminal Adapter Type III, Modem Clocking Multipoint for Multipoint Operation, New Sync (if required)
- 2848 Display Control mdls 1,2 and 3 Point-to-Point or Multipoint
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 1200 bps.
- ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.
- ▲ Features Required: Terminal Adapter Type II Multipoint for Multipoint Operation
- Modem: 3872 mdl 1
  - ▲ Line Speed: 2400 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
  - ▲ Features Required: Terminal Adapter Type III, Modem Clocking Multipoint for Multipoint Operation, New sync (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (without interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
    - ▲ Features Required: Terminal Adapter Type 1, mdl II, Switched Network Facility, 200 bps Line Speed, Connect Data Set to Line (if required)
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II 200 bps Line Speed
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 300 bps
    - ▲ Type of Communication Line Required: Code O
    - ▲ Features Required: Terminal Adapter Type 1, mdl II, Switched Data Network Facility, 300 bps Line Speed, Connect Data Set to Line (if required)
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 300 bps
    - ▲ Type of Communication Line Required: Code P
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 300 bps Line Speed
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt feature)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line control (with Transmit Interrupt feature)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)

- Modem: 3976 mdl 1
  - ▲ Line Speed: 200 bps
  - ▲ Type of Communication Line Required: Code N
  - ▲ Features Required: Terminal Adapter Type 1, mdl II, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt and Transmit Interrupt features)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7111 - 2740-1 Line Control
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code M
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, 200 bps Line Speed, Connect Data Set to Line (if required)
  - Modem 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 200 bps Line Speed
  - Modem: 3976 mdl 3
    - ▲ Line Speed 300 bps
    - ▲ Type of Communication Line Required: Code P
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 300 bps Line Speed
- 3767 Communication Terminal mdl 1, 2, or 3 with #7112 - 2740-2 Line Control
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 600 bps.
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps -OR- Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II, 600 bps Line Speed
- System/7
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
    - ▲ Features Required: Terminal Adapter Type 1, mdl II, Switched Network Facility, Connect Data Set to Line (if required)

- Modem: 3976 mdl 1
  - ▲ Line Speed: 134.5 bps
  - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - ▲ Features Required: Terminal Adapter Type 1 mdl II
- Modem: 3976 mdl 3
  - ▲ Line Speed: 600 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

**Note:** For information about the attachment of World Trade modems, refer to Table 2 - Parts 1 and 2, and to the M2700 pages.

**Table 2 -- Part 2**

**Features Required for Binary Synchronous Terminals**

- Modem: 3976 mdl 3
  - Line Speed: 600 bps
    - ▲ Manner of Operation: Point-to-Point
      - △ Communication Line and Modem Facilities (Nonswitched): Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
      - Features Required: Synchronous Data Adapter Type II, 600 bps, and Half Duplex Facility, Data Code features
    - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
    - Features Required: Synchronous Data Adapter Type II, 600 bps, Data Code features
    - △ Communication Line and Modem Facilities (Switched): PTT switched telephone network, with half-duplex modems, capable of operating at 600 bps.
    - Features Required: Synchronous Data Adapter Type II, 600 bps, Switched Speed and Switched Network Facility, Data Code features, Connect Data Set to Line (if required)
  - ▲ Manner of Operation: Multipoint -- 3135 as Control Station
    - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
    - Features Required: Synchronous Adapter Type II, 600 bps, Data Code features
  - ▲ Manner of Operation: Multipoint -- 3135 as Tributary Station
    - △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

privately owned communication facility), capable of operating at 600 bps.

Features Required: Synchronous Data Adapter Type II, 600 bps, Tributary Station, Data Code features

- Line Speed: 1200 bps

▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.

Features Required: Synchronous data Adapter Type II, Half Duplex Facility, Data Code features

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Data Code features

- △ Communication Line and Modem Facilities (Switched): PTT switched telephone network, with half-duplex modems, capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Switched Speed, Switched Network Facility, Data Code features, Connect Data Set to Line (if required)

▲ Manner of Operation: Multipoint -- 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Data Code features

▲ Manner of Operation: Multipoint -- 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication line), capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Tributary Station, Data Code features

● Modem: 3863 mdl 1, 3872 mdl 1

- Line Speed: 2400 bps

▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

▲ Manner of Operation: Multipoint - 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, and Data Code features, New Sync (if required)

▲ Manner of Operation: Multipoint - 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code Features

● Modem: 3864 mdl 1, 3874 mdl 1

- Line Speed: 4800 bps

▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

▲ Manner of Operation: Multipoint - 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

▲ Manner of Operation: Multipoint - 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features

● Modem: 3875 mdl 1

- Line Speed: 7200 bps

▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 7200 bps

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code Features

▲ Manner of Operation: Multipoint - 3135 as Control Station

## MACHINES

- △ Communication Line and Modem Facilities:  
None Specified

Features Required: Synchronous Data  
Adapter Type II, Modem Clocking, Data Code  
Features

- ▲ Manner of Operation: Multipoint - 3135 as  
Tributary Station

- △ Communication Line and Modem Facilities  
(Nonswitched): Four-wire, full-duplex, PTT  
leased line telephone service (or equivalent  
privately owned communication facility), ca-  
pable of operating at 7200 bps.

Features Required: Synchronous Data  
Adapter Type II, Modem Clocking, Tributary  
Station, Data Code Features

**Planning For Model Conversions:** When a customer requires fea-  
ture changes (except for the prerequisite feature Extended Preci-  
sion Floating Point, #3840), and/or memory upgrades in addition to  
a model upgrade to a 3135-3, consolidating the several changes into  
a single MES is not recommended. In these cases, a planning ses-  
sion between sales, CE and the customer is required in addition to  
the normally required branch office review/approval to develop the  
proper sequence of MES ordering.

From	To	A1	A2	A3	A4
H		X	X	X	X
HF			X	X	X
HG				X	X
I					X
A1			X	X	X
A2				X	X
A3					X

**Note:** For information about the attachment of World Trade mod-  
ems, refer to Table 2 - Parts 1 and 2, and to the M2700 pages.

## ACCESSORIES (NONE)

## MODEL CONVERSIONS

## SUPPLIES (NONE)

Field Installable.

## 3138 PROCESSING UNIT

### PURPOSE

Provides main and control storage plus arithmetic and logic circuits for the S/370 mdl 138.

### MODELS

**Model I I00:** 524,288 bytes of processor storage

**Model J J00:** 1,048,576 bytes of processor storage

**Prerequisites:** Each S/370 mdl 138 requires a 3046 power unit --- see M3046 pages.

### HIGHLIGHTS

524,288 bytes or 1,048,576 bytes of processor storage are provided. CPU cycle time ranges from 275 to 1485 nanoseconds depending on the internal operation being performed. 16 general purpose and four floating point registers are provided.

### Standard Features:

- Conditional Swapping
- APL Assist
- Audible Alarm
- Byte Oriented Operand
- 1 Byte Multiplexer Channel
- 64 Byte Multiplexer Subchannels
- 2 Block Multiplexer Channels
- 16 Non-Shared Block Multiplexer Subchannels
- 1 Shared Block Multiplexer Subchannel
- Channel Command Retry
- Channel Indirect Addressing
- Clock Comparator & CPU Timer
- Console File
- Control Registers
- Dynamic Address Translation
- Error Checking and Correction (on Main and Control Storage)
- Extended Control Mode
- Extended Control-Program Support
- Extended Precision Floating Point
- Instruction Retry
- Floating Point
- Interval Timer
- Machine Check Handling
- OS/DOS Compatibility
- Program Event Recording
- Storage Protection (Store and Fetch)
- S/370 Universal Instruction Set
- Time of Day Clock
- PSW Key Handling.

**Control Storage:** 131,072 bytes of Reloadable Control Storage are provided in addition to main storage. This permits emulator and control routines to function. The Reloadable Control Storage is housed in the CPU and is loaded from the Console File which is located beneath the operator's display console. Reloadable Control Storage is not available to the user.

**Virtual Storage:** Virtual Storage capability is provided to increase the effective utilization of main storage.

**Console File (Standard):** This is the basic microprogram loading device for the system. The console file contains a small file device that provides all of the microcode for the system on removable magnetic disks. The several disks that will be supplied with the system will supply all of the required microcode for diagnostics, basic systems features, plus the optional features ordered for the system.

### Console Function:

- A display console is standard
- includes a cathode ray tube, and a keyboard
- functions as an operator's I/O console to communicate with the operating system
- standard attachment for an optional 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 for hard copy output

CRT can accommodate twenty-four 80-character lines of information. A system control panel is also located on the 3138 for additional operator communication with the system. Three console modes are available:

Printer-keyboard Mode  
Display Mode  
115/125 Console-display-emulation Mode

In "Printer-keyboard" mode, the display console uses the keyboard for input and the CRT and a recommended 3286 mdl 2 or 3287 mdl 1 and 2 for output. The CRT, keyboard and printer appear to the system as a 3215 Console Printer-Keybaord. "Printer-Keybaord" mode is supported by DOS, DOS/VS, OS/360, OS/VS and VM/370.

In "Display" mode, the keyboard is used for input, the CRT with 24 lines by 80 characters/line for output, and DDOCS or equivalent support is required. DOS/VS does not support Display Mode. The 3286 Printer mdl 2 or 3287 Printer mdl 1 or 2 (optional) has a separate address and requires MCS support or equivalent. When present, the printer appears to the system as a 3213 Console Printer.

In "115/125 Console-display-emulation" mode, the keyboard is used for input, the CRT is used for output, and the CRT displays twelve 56-character lines of information. The 3286 mdl 2 or 3287 mdl 1 or 2 are optional. When present, the printer emulates a 5213 Printer mdl 1 and acts as a slave unit to the display console. That is, the 3286 mdl 2 or 3287 mdl 1 or 2 are not separately addressable in this mode. The "115/125 Console-display-emulation" mode is available in DOS/VS Release 28 and above.

The display console provides the capability to select three aspects of the system's environment at IMPL time:

Console mode - See above (Mode Descriptions).  
CPU mode (3138 or 3135) - See "Programming Features".  
Unit addresses of natively attached I/O.  
Integrated Communications Adapter Line Characteristics - See "Integrated Communications Adapter Features".

These selections will be recorded on the console file for permanent reuse until such time as any new selection is made during a subsequent IMPL. (Note: This is the only user access to the console file.) A right reading board extension is standard; a left extension is not available.

### Input/Output Channels

#### Byte Multiplexer Channel

- One is standard
- functionally equivalent to the byte multiplexer channel on the S/370 mdl 135
- provides eight control unit positions
- in byte mode, permits simultaneous operation of many low-speed devices
- burst mode operation of unbuffered devices operating in excess of 10KB is not allowed for concurrent operation with the Integrated File Adapter, the Integrated Communications Adapter, or a Block Multiplexer Channel - see "IBM S/370 Model 138 Channel Characteristics Manual", GA24-3633, for further clarification; for OS exclusion refer to SRL GC28-6554, System Generation.

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See Multiplexer Subchannels, Add'l, in "Special Features".

## Block Multiplexer Channels:

- Two are standard
- data rates are 1.3 megabytes per second
- permits simultaneous operation of high-speed devices
- ability to "Block Multiplex" provides greater channel efficiency and increases the efficiency of the 3330/3340 Series IFA when using direct access storage devices equipped with rotational position sensing
- devices on these channels which cannot utilize block multiplexing will function as if attached to selector channels
- if the 3330/3340 Series Integrated File Adapter is present these channels are addressed as 2 and 3 respectively. Otherwise they are addressed as 1 and 2.

**Subchannels:** On the byte multiplexer channel 64 subchannels are provided as standard with the option of 128 or 256 (see "Special Features"); for each of the two standard block multiplexer channels 16 non-shared subchannels and 1 shared selector subchannel are provided as standard with the option of 8 non-shared and 9 shared or 8 non-shared and 5 shared (see "Special Features"); each of the standard single shared subchannels may attach a control unit having a maximum of 16 device addresses.

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

## Input/Output Attachment

**Non-Native:** A wide variety of I/O devices may be attached to the S/370 mdl 138 via the standard byte multiplexer channel or any of the two standard block multiplexer channels.

**Native:** The following integrated I/O attachments/adapters are provided for controlling the designated I/O devices:

Integrated 3203-4 Printer Attachment, First Printer (Optional) - Provides the capability to natively attach the 3203 Printer mdl 4 as the first systems printer. The Universal Character Set feature is standard on the 3203.

Integrated 3203-4 Printer Attachment, Second Printer (Optional) - Provides the capability to natively attach the 3203 Printer mdl 4 as the second systems printer. The Universal Character Set feature is standard on the 3203.

Integrated 1403 Printer Adapter (Optional) - This feature allows native attachment of a 1403 Printer mdl 2, 7, or N1; the Universal Character Set Feature can be optionally specified on the 1403 mdl 2 or N1.

Integrated Console Printer Adapter (Standard) - Provides the capability to natively attach the optional 3286 Printer mdl 2, 3287 Printer mdl 1 and 2 as a hard copy console printer.

3330/3340 Series Integrated File Adapter (Optional) - This feature allows the native attachment of one or two 3333 modules or 3340 mdl A2 units; each 3333 module (either mdl 1 or mdl 11) can attach up to three 3330 modules (any combination of mdls 1, 2 or 11); each 3340 mdl A2 can attach 3340 mdl B2 or B1 units, and one 3340 mdl A2 can also attach 3344 units to a maximum of eight drives; maximum is 16 drives per IFA.

Integrated Communications Adapter (Optional) - This feature provides for attachment of up to eight teleprocessing lines to the S/370 mdl 138; these may be any combination of supported BSC and Start/Stop lines and appear to the processor as if connected via one or more 2701s on the byte multiplexer channel.

**Integrated Communications Adapter Features:** To improve the ordering of the ICA on the S/370 mdl 138, the user may define, from the display-console-keyboard, the following line characteristics for each line installed (a maximum of 8 lines are attachable to the ICA):

1. Leased Facility\* or Switched Network Facility: Allows the Terminal Adapter Type 1 mdl II, Synchronous Data Adapter Type II (SDA), or Telegraph Adapter Type II to operate over leased or C-type switched lines.

2. Half-Duplex Facility or Full Duplex Facility\* - Allows the user to make a business tradeoff between his TP applications and turn-around requirements and available teleprocessing facilities. and the cost of those facilities; half-duplex is required if the Synchronous Data Adapter Type II is attached to a 2-wire facility or that facility is part of a switched network unless that facility is a leased line and the Synchronous Data Adapter Type II is installed and functioning as a tributary station and not functioning as a control station on that leased line.
3. Primary Code for the SDA Type II (EBCDIC\*, ASCII, 6-Bit).
4. Secondary or Alternate Code for the SDA Type II (EBCDIC\*, ASCII, 6-Bit).
5. Tributary Station Address - Allows the user to specify a station address A to R of any Synchronous Data Adapter Type II which is installed and functioning on a leased communications line as a tributary station and not functioning as a control station on that leased line. (Station address 0829\*) Only addresses A to R are valid.
6. Line Speed:
  - a. 134 bps\*, 200 bps, 300 bps, or 600 bps for Terminal Adapter Type 1 mdl II.
  - b. 600 bps or 1200 bps\* for Synchronous Data Type II.
  - c. Not applicable for Terminal Adapter Type III or Telegraph Adapter Type II.
7. Transparency - Yes or No\* - Provides the SDA Type II with the ability to transmit and receive 8-bit binary as well as EBCDIC or ASCII codes or 6-bit binary data as well as 6-bit Transcode; Transparency with ASCII modifies VRC/LRC checking to VRC/CRC checking. Limitations: ASCII code and Transparency cannot be installed together for the same line position when attached to the 2780, 3780, System/3, System/7, System/32 or System/34. Prerequisite: SDA II.
8. Write Interrupt - Yes or No\* - Allows the Terminal Adapter Type 1 mdl II to operate with a 2741 equipped with Receive Interrupt (#4708). Limitations: Not supported under BTAM, QTAM, or TCAM. Prerequisite: Terminal Adapter Type 1 mdl II.
9. Read Interrupt - Yes or No\* - Allows the Terminal Adapter Type 1 mdl II to operate with a 2741 equipped with Transmit Interrupt (#7900). Limitations: Not supported under BTAM, QTAM, or TCAM. Prerequisite: Terminal Adapter Type 1 mdl II.
10. New SYNC - Yes or No\* - Allows the Synchronous Data Adapter Type II or Terminal Adapter Type III to be connected to modems which offer the New Sync feature option and have this option installed. New Sync minimizes modem turnaround and allows faster bit synchronization of the following data. Prerequisites: Modem Clocking (#9606-#9616), and a modem offering New Sync. Note: New Sync is not required if Half Duplex Facility, Tributary Station, or Switched Network is selected for the line position in question.
11. Multipoint - Yes or No\* - Specifies that a Terminal Adapter Type III is to operate in multipoint mode. If multipoint is not selected for a given Terminal Adapter Type III, point-to-point operation is presumed. Prerequisite: Terminal Adapter Type III.
12. Unit Exception Suppression - Yes or No\* - If selected with Terminal Adapter Type 1 mdl II, Unit Exception will not be set in response to a circle C. Limitations: Not supported under BTAM, QTAM, or TCAM. Prerequisite: Terminal Adapter Type 1 mdl II.
13. Connect Data Set To Line - Yes or No\*: Allows the user to define those switched network lines which will contain this feature and thus, the line(s) to which the user can attach modems requiring this feature. Consult your Teleprocessing Coordinator to determine specific modems requiring this feature. Field Installation: Yes. Prerequisites: Terminal Adapter Type

I mdl II or SDA Type II and switched network facility definition for the appropriate line(s) from the display-console-keyboard.

\* These options will comprise the standard microcode on the console file as shipped from the plant. They may be altered, as explained, from the display-console-keyboard at the operator's discretion.

**Note:** See "Special Features" for optional "ICA features" on the S/370 mdl 138.

## Programming Features:

**Conditional Swapping (Standard):** Provides two additional instructions; Compare and Swap; Compare Double and Swap.

**PSW Key Handling (Standard):** Provides two additional instructions; Insert PSW Key; Set PSW Key from Address.

**APL Assist (Standard):** This feature is an APL emulator. It replaces functions performed by the APL software interpreter. This feature can provide a performance improvement for many APL applications when used with VS APL PP (5748-AP1).

**IMPL 3135 CPU Mode Selection:** Provides the capability to "run" on S/370 mdl 138 any SCP which will "run" today on a S/370 mdl 135. No performance degradation or loss of S/370 mdl 135 recovery from error capabilities will be experienced in this mode. That is, in 3135 CPU Mode the improved hardware performance of the S/370 mdl 138 will be available to the user. Moreover, the user will have the same recovery capabilities on the S/370 mdl 138 as he has on a S/370 mdl 135 when 3135 CPU Mode is selected. **Note:** S/370 mdl 138 Extended Logout/EREP is not supported in this mode.

**Extended Control Program Support (Standard):** The S/370 mdl 138 includes Extended Control-Program Support. This is a hardware assist that reduces the CPU time needed to execute certain frequently used supervisor functions in both VS1 and VM/370.

The functional areas for VM/370 include:

- Virtual Machine I/O
- Storage Management
- Page Management
- SVC Handler
- Privileged Instruction Interfaces
- Dispatching
- Virtual Interval Timer

For VS1 the functional areas are:

- Storage Management
- IOS
- SVC FLIH
- System Trace
- Page Management

**Publications:** GC20-0001

## SPECIFY

- Power (AC, 3-phase, 50 and 60 Hz):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
- Order the Online Test System (OLTS) for your customer's configuration as required: initially or when being modified. Contact IBM for ordering procedure.
- Cabling: #9080 for below the floor, #9081 for on the floor.
- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Control Panel Language Group: #2927 for English, #2928 for French, #2929 for German.

- Display Console Nomenclature (plant installation only):

English US	#2827	Italian	#2832
French	#2828	Spanish	#2831
German	#2829		

- Keyboard Language (must be specified at time of order):

Brazil	#2959	Ger. QUERTY	#2972
Eng.US	#2956	Italy	#2968
Fr. AZERTY	#2964	Spain	#2960
Fr. QWERTY	#2970	Span Speak	#2969
Ger. QWERTZ	#2957		

- Minimum Configuration: See "Minimum Configurations" in "Systems" for minimum I/O units required in S/370 mdl 138.

- Shipping Instructions: Unless otherwise specified, shipping dimensions of the 3138 Frame 01 (CPU) are 800mm (31-1/2 in.) wide x 1778mm (70 in.) long x 1524mm (60 in.) high. Removal of the side covers will reduce the width to 749mm (29-1/2 in.). If further reduction in width is required, specify #9570. Shipping dimensions will then be 749mm (29-1/2 in.) wide x 1524mm (60 in.) long x 1524mm (60 inches) high.

- IOC Site Mobility Cart: #9585 Check with CE Physical Planning to determine if it is available locally.

**Note:** Subchannel requirements must be reviewed when adding new I/O to ensure adequate number are available. See "Special Features".

## SPECIAL FEATURES

**Autocall (#1290)(Canada only):** Provides automatic calling capabilities on the public switched telephone network to initiate (dial) through stored program control, a data link to a remote station. For the appropriate automatic calling units, see M2700 pages. Specify: Refer to Table 1-C for Terminal Adapter Type 1 mdl II or Table 1-E for Synchronous Data Adapter Type II or Table 1-F for Telegraph Adapter Type II for appropriate feature code according to line positions desired. Maximum: Four. Limitations: Each Autocall feature installed reduces the number of lines available on the ICA by one. Autocall must be ordered once for each line where the function is desired. Thus, the ICA can accommodate a maximum of four lines if each of these lines also has the Autocall feature. A single Autocall feature can be associated with any of the lines from one to seven. Cable Order: Required. Field Installation: Yes. Prerequisites: #9721-#9728, #9649-#9656 or #9785-#9792 #9792 and Switched Network Facility selection from the display console.

**Block Multiplexer Shared Subchannel (#1431):** Note: This feature should be installed only if devices capable of "Block Shared" operation are installed on the block multiplexer channel. See "370 I/O Configuration Form", GA22-7002. Allows any one of the following combinations of "Non-Shared", "Block Shared" or selector subchannels to be attached to the block multiplexer channel: (1) 16 Non-Shared and 1 Shared Selector (see address restrictions); (2) 8 Non-Shared, 8 Block Shared and 1 Shared Selector (see address restrictions); (3) 8 Non-Shared, 4 Block Shared and 1 Shared Selector (see address restrictions). If option (2) is selected, then each block shared subchannel may have attached to it a control unit having a maximum of 16 device addresses. If option (3) is selected, the four block shared subchannels may each have attached a control unit having a maximum of 32 device addresses. If option (1) is selected, no block shared subchannels are available, and addresses X00 through X7F are not available. With any option, the selector subchannel may have attached to it control units with a maximum of 16 device addresses. This feature will apply to both selector channels if installed. The options are selectable by the Customer Engineer and may be defined differently on each channel. Maximum: One. Field Installation: Yes.

**Address Restrictions with #1431:** a) Addresses X00 through X7F are assigned as block shared subchannels. With option (1) they may not be used. With option (2) each control unit address position, i.e., X00,

X10, X20, etc. through X70, is available. With option (3) "even" address positions only are available, i.e., 00, 20, 40 and 60. b) Selector and Non-Shared addresses are limited to addresses X80 through XFF.

**Channel Priority (#1502):** When the IFA (#4655) is present, this feature changes the higher priority for command chaining from the first block multiplexer channel (Channel 2) to the second block multiplexer channel (Channel 3). #1502 is required if any DASD devices are to be attached to Channel 3. Field Installation: Yes. Prerequisites: #4655.

**OCR Multifont (#2989):** Permits the execution of the Multifont Preprocessor programming support. The programming support, in turn, provides a means of translating input data produced by the Multifont Preprocessor feature of the 1287 mdl 5 and the 1288 mdl 1 to EBCDIC characters. Field Installation: Yes.

**Direct Control (#3274):** Provides two instructions, Read Direct and Write Direct, and six distinct external interrupt lines which are independent of data channel operations. The read and write instructions provide timing signals and transfer a single byte of information, normally for controlling or synchronizing purposes between two cable-connected processing units, or a cable-connected processing unit and external devices. Maximum: One. Cable Order: Required. Field Installation: Yes. Prerequisites: External devices must meet the interface specifications outlined in "S/360 Direct Control Feature - OEMI", GA22-6845.

**Emergency Power-Off Control (#3621, #3622):** To provide, in effect, a single emergency power-off switch in a room or area where cable connection is other than via communication lines. #3621 to interconnect two emergency power-off switches; #3622 to interconnect up to 12 emergency power-off switches. For further information, see "S/370 Installation Manual - Physical Planning", GC22-7004. Field Installation: Yes.

**Multiplexer Subchannels, Add'l (#3906, #3907):** To increase the number of I/O devices on the byte multiplexer channel, the number of subchannels can be increased by specifying one of the following: #3906 -- for 128 subchannels; #3907 -- for 256 subchannels. The maximum number of shared subchannels is eight. When 256 subchannels are installed there are no shared subchannels. Note: The number of subchannels ordered must be equal to or greater than the device addresses. Also see "Byte Multiplexer Channel" under "Input/Output Channels" above. Field Installation: Yes.

**1401/1440/1460 Compatibility (#4457):** Microprogram controlled feature, which, in conjunction with special software, permits the system to execute 1401/1440/1460 instructions. Field Installation: Yes.

**Integrated Communications Adapter (#4640):** Provides the circuits and controls for direct attachment of up to eight teleprocessing lines to the S/370 mdl 138. The controls for the first line adapter are included in this feature. Lines can be any combination of Start/Stop or BSC. Provides for the attachment of 1050, 2260 mdl 1, 2260 mdl 2, 2265 mdl 1, 2740 mdl 1, 2740 mdl 2, 2741 mdl 1, 2760 mdl 1, 5010 AXX, or any IBM computer multiplexer or terminal conforming to the Binary Synchronous Communications (BSC) standard. Note: In addition to the appropriate adapter, each communications line attached to the system requires an external modem. Refer to Table 2 below to define customer configuration requirements prior to ordering features below. Customer Responsibilities -- see M2700 pages for customer responsibilities communications facilities and servicing requirements. Communications Facilities -- see M2700 pages for communications facility requirements with this feature. Field Installation: Yes.

See "Specify Requirements for Integrated Communication Adapter" under "Specify".

**3330/3340 Series Integrated File Adapter (#4655):** Permits native attachment of up to two 3333s or 3340 mdl A2s. A maximum of sixteen 3330 or 3340 series drives can be attached to the IFA. The IFA supports rotational position sensing, disconnected command

chaining and multiple requesting. Record overflow is standard. For 3330, standard I/O addresses are (hex) 150 through 15F. For 3340, standard addresses are (hex) 1C0 through 1CF. For 3340 with 3344, standard addresses are (hex) 1C0 through 1E1. Maximum: One. Field Installation: Yes.

Specify:

1. DASD Designation -- Specify ONE of the following -- #9313\* (DASD 3333/3330) to attach up to two 3333 mdl 1s, each with up to three 3330 mdls 1/2 in any combination -- #9314\* (DASD 3340 only) to attach up to two 3340 mdl A2s, each with up to three 3340 mdls B1/B2 in any combination -- #9315\* (3333/3340 Intermix) to attach one 3333 mdl 1 (with up to three 3330 mdls 1/2 in any combination) plus one 3340 mdl A2 (with up to three 3340 mdls B1/B2 in any combination.)
2. If any 3333 mdl 11 and/or 3330 mdl 11 is to be attached, also specify #9316\* (3333/3330 mdl 11) in addition to #9313 or #9315.  
  
With #9313 plus #9316, a mixture of one 3333 mdl 1 and one 3333 mdl 11, each with up to three 3330 mdls 1, 2, and 11 (in any combination) can be attached -- or two 3333 mdl 11s, each with any mixture of up to three 3330 mdls 1, 2, and 11.  
  
With #9315 plus #9316, one 3333 (either mdl 1 or mdl 11) with up to three 3330 mdls 1, 2, and 11 (in any combination) can be attached in addition to one 3340 mdl A2 with up to three associated mdls B1/B2. The standard addresses with #9315 for 3330 are (hex) 150 through 157, for 3340 (hex) 158 through 15F.
3. If any 3344 is to be attached, specify #9317\* in addition to #9314 (#9317 and #9315 are mutually exclusive). #9190\* must also be specified if 3344 mdl B2Fs or the 3340 Fixed Head Feature (#4301/#4302) is ordered.  
  
With #9314, #9317, and #9190 up to three 3344 mdl B2/B2F and/or 3340 mdl B2, B1 units in any combination can be attached to one 3340 mdl A2. The second 3340 mdl A2, if present, can attach up to three 3340 mdl B1/B2 units.
4. When #9314 is specified, also specify 3340 Address Designation: #9820\* for addresses (hex) 1C0 through 1CF, or #9821\* for addresses (hex) 160 through 16F. The specification of 160 allows the 3138 IFA addresses to coincide with those of the 3115 and 3125 IFAs.
5. When #9314 or #9315 is specified, also specify #9190\* (Fixed Head Attachment) if Fixed Head Feature (#4301/#4302) is ordered for any 3340 attached to the IFA.
6. If String Switch (#8150) is ordered for any attached 3333 or 3340 mdl A2, specify String Switch Attachment (#9841\*).
7. When #9821\* is specified in conjunction with #9313 the addresses for the 3333/3330s are (hex) 160 through 16F.
8. When #9821\* is specified and both #9314 and #9317 are specified, the addresses for the 3340/3344s are as follows:

\* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

	3340 A2	---	3344 B2/B2Fs	---
S	*-----*	*	*-----*	*
t	160   161	162   163   164   165   166   167		
r	---   ---	---   ---   ---   ---   ---   ---		
i	172   173	174   175   176   177		
n	*-----*			
g		1E2   1E3   1E4   1E5   1E6   1E7		
		---   ---   ---   ---   ---   ---		
0		1F2   1F3   1F4   1F5   1F6   1F7		
		---   ---   ---   ---   ---   ---		
	0 1 2 3 4 5 6 7			
	Physical Drive			

3340 A2 ---- 3340 B2s ----

\*-----\*  
1 | 168 | 169 | | 16A | 16B | 16C | 16D | 16E | 16F |  
\*-----\*

Note 1: The DASD control combinations that can be attached to the 3330/3340 Series IFA (#4655) are shown in the left hand column of the table below. From Section A of the table select one of the feature numbers shown (one and only one must be selected). From Section B select the feature number(s) required to support your configuration (select none, one, or more than one from Section B). Section C of the table shows the addresses available. The specification of the (hex) 160 addresses allows the 3138 IFA addresses to coincide with those of the 3115 and 3125 IFA. Select a number from Section C if required.

Note 2: Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.

### 3138 3330/3340 IFA (#4655)

S e c t.	DASD Control Combinations (#4655)	3333 Disk Stor Cntrl	3333/ 3340	In 3340 Direct Access Storage Facility
A	DASD Designation, one req'd	#9313 **	#9315 **	#9314**
	If any 3333 mdl 11 and/or 3330 mdl 11	#9316 **	#9316 **	
	3344	-	-	#9317**
	3344 mdl B2F	-	-	#9317 + #9190**
B	Fixed Head Feature (#4301/4302) on 3340	-	#9190 **	#9190**
	String Switch (#8150) on 3333/3340	#9841 **	#9841 **	#9841**
	2314/3340 Compatibil- ity Feature see (#8070)	-	-	*** #8070
C	Standard	*Hex 150- 15F	*3330 Hex	150 1C #98 3344 Not Hex 3344 1C0- Hex 1E1
	Address 160	#9821 ** Hex 160- 16F	-	#9821 ** Not 3344 Hex 160- 16F

- \* No feature number required.
- \*\* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only Changes ordered on the same diskette.
- \*\*\* Mutually exclusive with String Switch (#9841), 3130/3340 Intermix (#9315), 3344 Attachment (#9317).

**Integrated 1403 Printer Adapter Basic Control (#4670):** Provides the power supply and basic control for a natively attached 1401 Printer. Maximum: One. Field Installation: Yes.

See table below for corresponding voltages for 50 Hz

CPU	1403
220	220
235	220
380	380
408	380

**Integrated 1403 Printer Mdl 2, Mdl N1 Attachment (#4672):** Provides control for attaching 1403 mdl 2 or N1. Specify: #9182\* to attach 1403 mdl 2, #9188\* to attach 1403 mdl N1. Maximum: One. Field Installation: Yes. Prerequisites: #4670. On the 1403, #9709 and #9725 are required on a mdl 2; #9726 is required on a mdl N1. See Specify under 1403.

**Integrated 1403 Printer Mdl 7 Attachment (#4677):** Provides control for attaching a 1403 mdl 7. Maximum: One. Field Installation: Yes. Prerequisites: #4670. On the 1403, #9725 (see "Specify" in M1403 pages).

**Add'l Lines (#4722-#4728):** Each provides circuits and Controls for attachment of an additional line adapter --- for a total if eight lines in a system. Specify: Order additional lines according to line position required --- see Table 1-A below. Each line specified requires the next lower order line as a prerequisite. Maximum: One of each (#4722 through #4728). Field Installation: Yes. Prerequisites: #4640.

**Specify Requirements For Integrated Communications Adapter:** For each line (#4722-#4728) attached to the ICA, including the first line included in the Integrated Communications Adapter (#4640), one of the following line adapters must be specified: Terminal Adapter Type 1 mdl II (#9721-#9728), Terminal Adapter Type III (#9753-#9760), Telegraph Adapter Type II (#9785-#9792), or Synchronous Data Adapter Type II #9649-#9656). Each line adapter and all associated features must be specified according to the line position to which they correspond. Refer to table 2 below prior to ordering features for the ICA.

**S/360 Mdl 20 Compatibility (#7520):** Microprogram controlled feature which, in combination with special software, permits the system to execute S/360 mdl 20 or S/360 mdl 25 in mdl 20 mode instructions. Field Installation: Yes.

**2314/3340 Compatibility Feature (#8070):** Permits the evaluation of 2314/2319 volumes on the 3340 Disk Storage. The user program may access both the emulated 2314 data set as well as 3340 volumes. This provides a "mixed-mode" operating environment. "Mixed-mode" is only possible with DOS releases which support 3340 on the mdl S/370 mdl 138. Maximum: One. Field Installation: Yes. Limitations: Cannot be installed with 3333/3340 Intermix (#9315), 3344 Attach (#9317), or String Switch Attachment (#9841). Prerequisites: #9314 on #4655.

**Integrated 3203-4 Printer Attachment, First Printer (#8175):** Provides the capability to natively attach the 3203 Printer mdl 4. Maximum: One. Field Installation: Yes.

**Integrated 3203-4 Printer Attachment, Second Printer (#1076):** Provides the capability to natively attach a second 3203 Printer mdl 4. Maximum: One. Field Installation: Yes. Prerequisites: #8075.

**Universal Character Set Adapter (#8637):** Permits the use of the Universal Character Set feature on a 1403 mdl 2 or N1 attached via

the Integrated 1403 Printer mdl 2, mdl N1 Attachment (#4672). Maximum: One. Field Installation: Yes. Prerequisites: #4670, #4672.

**Modem Clocking (#9609-#9616):** Allows a Terminal Adapter Type III to operate at 2400 bps or a Synchronous Data Adapter Type II to operate at 2000 bps, 2400 bps, 4800 bps or 7200 bps. Requires the appropriate clocking to be in the attached modem. Note: Certain models such as the 3872 mdl 1, although basically 2400 bps modems, offer a 1200 bps half speed facility. Since the requirements for the Modem Clocking feature are defined by the type of modem, not the line speed, when such modems are attached to the Synchronous Data Adapter Type II and are stitched for 1200 bps operation, Modem Clocking is still required as a prerequisite on the ICA. Specify: Refer to Table 1-D for Terminal Adapter Type III or Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Terminal Adapter Type III or Synchronous Data Adapter Type II.

**Switched Speed (#9641-#9648):** Provides control of data signaling rate selection from the display console keyboard via the Mode Select key. Speed selection can be 600 bps or 1200 bps. Specify: Refer to Table 1-E for Synchronous Data Adapter Type II for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: Synchronous Data Adapter Type II.

**Synchronous Data Adapter Type II (#9649-#9656)\*:** Provides control of data transfers between the 3138 and binary synchronous terminals. See "Binary Synchronous Terminals" under 2701 Data Adapter Unit. Control Station is included with this feature. Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Speed Selection: Provides operation over facilities at 600 bps if 600 Bits Per Second is selected from the display console. Provides operation over the Public Switched Telephone Network or nonswitched Voice Grade Lines at 1200 bps (no speed need be specified). Provides operation over the Public Switched Telephone Network at speeds up to 4800 bps, nonswitched Voice Grade Lines at speeds up to 7200 bps and Public Switched and nonswitched Data Networks at speeds up to 4800 bps all provided that the clocking is supplied from the attached DCE. Field Installation: Yes. Prerequisites: #4640. Special Requirements: See Table 1-E for additional specify requirements if Autocall is required. See Table 1-E and Modem Clocking above if 2000 bps, 2400 bps, 4800 bps, or 7100 bps operation is required. The appropriate Data Code must be selected from the display console. Limitations: For line speed limitations, refer to "Model 138 Channel Characteristics Manual", GA33-3010.

**Terminal Adapter Type 1 Mdl II (#9721-#9728)\*:** Control data transfers between the 3138 and 1050/2740 mdl 1/2741/5010 mdl AXX between the 3138 and 2740 model 2 or 5010 mdl AXX between the 3138 and a 2741 Over Facility K1M. Includes vertical and longitudinal checking for 1050 terminals and 2740s equipped with Record Checking (#6114). Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Special Requirements: See Table 1-C for additional specify requirements if Autocall is required. Field Installation: Yes. Prerequisites: #4640.

**Terminal Adapter Type III (#9753-#9760)\*:** Controls data transfers between the 3138 and either remote 2845 Display Controls or 2848 Display Controls operating at 1200 bps. Permits operation at 2401 bps if Modem Clocking is specified. Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: #4640.

**Telegraph Adapter Type II (#9785-#9792)\*:** Controls data transfers between ICA and Model 33/35 TTY terminals (8 level code at 110 bps only). Specify: Refer to Table 1-B for appropriate feature code according to line position(s) desired. Field Installation: Yes. Prerequisites: #4640 and Switched Network Facility selection from the display console.

\* CPU diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

**Modems** Up to eight modems can be attached to a 3138. Prerequisites: Integrated Communications Adapter (#4640) and Synchronous Data Adapter Type II (#9649-#9656) 2400 bps to 7200 bps, Terminal Adapter Type 1 mdl II (#9721-#9728) 134.5 bps to 600 bps, or Terminal Adapter Type III (#9753-#9760) 1200 bps or 2400 bps. See feature descriptions for limitations.

Modem	Speed (bps)	Facility
3976 mdl 1	up to 200	Nonswitched
3976 mdl 2	up to 200	Switched
3976 mdl 3	up to 1200	Nonswitched or Switched
3863 mdl 1/2	2400	Nonswitched or Switched
3868 mdl 1	2400	Nonswitched
3872 mdl 1	2400	Nonswitched or
		Switched
3864 mdl1/2	4800	Nonswitched or Switched
868 mdl 2		4800 Nonswitched

**Note:** For communications capabilities, product utilization and special features, see M2700, 3863, 3864, 3868-1, 3868-2, 3872, and 3976 pages.

## Communication Information Tables

Before ordering, check Special Feature write-ups for Prerequisites and Limitations.

TABLE 1-A Additional Line Appearances

	Line Position			
Feature	1	2	3	4
Additional Lines	4640	4722	4723	4724
	Line Position			
Feature	5	6	7	8
Additional Lines	4725	4726	4727	4728

Specify additional lines according to line positions.

Table 1-B Terminal Adapters

	Line Position			
Feature	1	2	3	4
Terminal Adapter Type 1 mdl II	9721	9722	9723	9724
Terminal Adapter Type III	9753	9754	9755	9756
Synchronous Data Adapter Type II	9649	9650	9651	9652
	Line Position			
Feature	5	6	7	8
Terminal Adapter Type 1 mdl II	9725	9726	9727	9728
Terminal Adapter				

Type III	9757	9758	9759	9760	Feature	5	6	7	8
Synchronous Data Adapter Type II	9653	9654	9655	9656	Autocall Telegraph Adapter Type II	9781	9782	9783	
						9789	9790	9791	9792

Any adapter added, removed, or relocated to another line position requires reconfiguration of the entire line.

Select one terminal adapter for each line position specified in Table 1-A.

Table 1-C Options For Terminal Adapter Type 1 Mdl II

	Line Position			
Feature	1	2	3	4
Autocall	9777	9778	9779	9780
	Line Position			
Feature	5	6	7	8
Autocall	9781	9782	9783	

Table 1-D Options For Terminal Adapter Type III

	Line Position			
Feature	1	2	3	4
Modem Clocking	9609	9610	9611	9612
	Line Position			
Feature	5	6	7	8
Modem Clocking	9613	9614	9615	9616

Select modem clocking feature for each line position for which Terminal Adapter Type III is needed and operation at 2400 bps is desired.

Table 1-E Options For Synchronous Data Adapter Type II

	Line Position			
Feature	1	2	3	4
Modem Clocking	9609	9610	9611	9612
Autocall	9778	9779	9780	9781
Switched Speed	9641	9642	9643	9644
	Line Position			
Feature	5	6	7	8
Modem Clocking	9613	9614	9615	9616
Autocall	9780	9781	9782	9783
Switched Speed	9645	9646	9647	9648

Select features required for each line position for which Synchronous Data Adapter Type II is specific.

Table 1-F Option For Telegraph Adapter Type II

	Line Position			
Feature	1	2	3	4
Autocall	9777	9778	9779	9780
Telegraph Adapter Type II	9785	9786	9787	9788
	Line Position			

Table 2 -- Part 1

## Features Required for Start/Stop Terminals

- 1050 Data Communication System
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
    - Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Connect Data Set to line (if required).
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
    - Features required: Terminal Adapter Type 1 mdl II
- 2260 Display Station mdl 1
  - Connects via 2848 Display Control mdl 3 -- see this table
- 2260 Display Station mdl 2
  - Connects via 2848 Display Control mdl 1 or 2 -- see this table
- 2265 Display Station mdl 1
  - connects via 2845 Display control mdl 1 -- see this table
- 2740 Communication Terminal mdl 1
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
    - Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Connect data Set to Line (if required).
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
    - ▲ Features Required: Terminal Adapter Type 1 mdl II
- 2740 Communication Terminal mdl 2
  - Modem: 3976 mdl 1
    - ▲ Line Speed 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.

- Features Required: Terminal Adapter Type 1 mdl II
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 600 bps
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
  - Features Required: Terminal Adapter Type I mdl II, 600 bps
- 2741 Communication Terminal mdl 1 (without interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps
  - Features Required: Terminal Adapter Type 1 mdl II
- 2741 Communication Terminal mdl 1 (with Receive Interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - Features Required: Terminal Adapter Type i mdl II, Write Interrupt, Unit-Exception Suppression (if required)
- 2741 Communication Terminal mdl (with Transmit Interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - Features Required: Terminal Adapter Type 1 mdl II, Read Interrupt, Unit-Exception Suppression (if required)
- 2741 Communication Terminal mdl 1 (with receive Interrupt and Transmit Interrupt features)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, Read-Interrupt, Unit-Exception Suppression (if required)
- 2760 Optical Image Unit mdl 1
  - Connects via 2740 Communication Terminal mdl 1 -- see this table
- 2845 Display Control mdl 1 Point-to-Point or Multipoint
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 1200 bps
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.
  - Features Required: Terminal Adapter Type III Multipoint for Multipoint Operations.
- Modem: 3872 mdl 1
  - ▲ Line Speed: 2400 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
- Features Required: Terminal Adapter Type III, Modem Clocking Multipoint for Multipoint Operation, New Sync (if required).
- 2848 Display Control mdls 1,2 and 3 Point-to-Point or Multipoint
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 1200 bps.
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.
  - Features Required: Terminal Adapter Type II Multipoint for Multipoint Operation.
- Modem: 3872 mdl 1
  - ▲ Line Speed: 2400 bps
  - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.
- Features Required: Terminal Adapter Type III, Modem Clocking Multipoint for Multipoint Operation, New sync (if required).
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (without interrupt feature)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
  - Features Required: Terminal Adapter Type 1, mdl II, Switched Network Facility, 200 bps Line Speed, Connect Data Set to Line (if required)
  - ▲ Type of Communication Line Required: Code N
  - Features Required: Terminal Adapter Type 1 mdl II 200 bps Line Speed
- Modem: 3976 mdl 3
  - ▲ Line Speed: 300 bps
  - ▲ Type of Communication Line Required: Code O
- Features Required: Terminal Adapter Type 1, mdl II, Switched Data Network Facility, 300 bps Line Speed, Connect Data Set to Line (if required)
- Modem: 3976 mdl 3
  - ▲ Line Speed: 300 bps
  - ▲ Type of Communication Line Required: Code P

- Features Required: Terminal Adapter Type 1 mdl II, 300 bps Line Speed
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt feature)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
  - Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
  - Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line control (with Transmit Interrupt feature)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required (Switched): Code M
  - Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
  - Features Required: Terminal Adapter Type 1, mdl II, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7113 - 2741 Line Control (with Receive Interrupt and Transmit Interrupt features)
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code M
  - Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, Write Interrupt, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required), Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code N
  - Features Required: Terminal Adapter Type 1 mdl II, Write Interrupt, Read Interrupt, 200 bps Line Speed, Unit-Exception Suppression (if required)
- 3767 Communication Terminal mdl 1 or 2 with #7111 - 2740-1 Line Control
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 200 bps
    - ▲ Type of Communication Line Required: Code M
  - Features Required: Terminal Adapter Type 1 mdl II, Switched Network Facility, 200 bps Line Speed, Connect Data Set to Line (if required)

- Modem 3976 mdl 1
  - ▲ Line Speed: 200 bps
  - ▲ Type of Communication Line Required: Code N
- Features Required: Terminal Adapter Type 1 mdl II, 200 bps Line Speed
- Modem: 3976 mdl 3
  - ▲ Line Speed 300 bps
  - ▲ Type of Communication Required: Code P
- Features Required: Terminal Adapter Type 1 mdl II, 300 bps Line Speed
- 3767 Communication Terminal mdl 1, 2, or 3 with #7112 - 2740-2 Line Control
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 600 bps.
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps -OR- Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.
  - Features Required: Terminal Adapter Type 1 mdl II, 600 bps Line Speed
- System/7
  - Modem: 3976 mdl 2
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Switched): PTT switched network, capable of operating at 134.5 bps.
  - Features Required: Terminal Adapter Type 1, mdl II, Switched Network Facility, Connect Data Set to Line (if required)
  - Modem: 3976 mdl 1
    - ▲ Line Speed: 134.5 bps
    - ▲ Type of Communication Line Required (Non-switched): Two-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 134.5 bps.
  - Features Required: Terminal Adapter Type 1 mdl II
  - Modem: 3976 mdl 3
    - ▲ Line Speed: 600 bps
    - ▲ Type of Communication Line Required (Non-switched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

**Note:** For information about the attachment of World Trade modems, refer to Table 2 - Parts 1 and 2, and to the M2700 pages.

**Table 2 -- Part 2**

**Features Required for Binary Synchronous Terminals**

- Modem: 3976 mdl 3
  - Line Speed: 600 bps
  - ▲ Manner of Line Operation: Point-to-Point
  - △ Communication Line and Modem Facilities (Nonswitched): Two-wire, half-duplex, PTT leased line telephone service (or equivalent

privately owned communication facility), capable of operating at 600 bps.

Features Required: Synchronous Data Adapter Type II, 600 bps, and Half Duplex Facility, Data Code features

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

Features Required: Synchronous Data Adapter Type II, 600 bps, Data Code features

- △ Communication Line and Modem Facilities (Switched): PTT switched telephone network, with half-duplex modems, capable of operating at 600 bps.

Features Required: Synchronous Data Adapter Type II, 600 bps, Switched Speed and Switched Network Facility, Data Code features, Connect Data Set to Line (if required)

- ▲ Manner of Operation: Multipoint -- 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

Features Required: Synchronous Adapter Type II, 600 bps, Data Code features

- ▲ Manner of Line Operation: Multipoint -- 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 600 bps.

Features Required: Synchronous Data Adapter Type II, 600 bps, Tributary Station, Data Code features

- Line Speed: 1200 bps

- ▲ Manner of Line Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Two-wire, half-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.

Features Required: Synchronous data Adapter Type II, Half Duplex Facility, Data Code features

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Data Code features

- △ Communication Line and Modem Facilities (Switched): PTT switched telephone network, with half-duplex modems, capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Switched Speed, Switched

Network Facility, Data Code features, Connect Data Set to Line (if required)

- ▲ Manner of Operation: Multipoint -- 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Data Code features

- ▲ Manner of Operation: Multipoint -- 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication line), capable of operating at 1200 bps.

Features Required: Synchronous Data Adapter Type II, Tributary Station, Data Code features

- Modem: 3863 mdl 1, 3872 mdl 1

- Line Speed: 2400 bps

- ▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

- ▲ Manner of Operation: Multipoint - 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, and Data Code features, New Sync (if required)

- ▲ Manner of Operation: Multipoint - 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 2400 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code Features

- Modem: 3864 mdl 1, 3874 mdl 1

- Line Speed: 4800 bps

- ▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

▲ Manner of Operation: Multipoint - 3135 as Control Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code features

▲ Manner of Operation: Multipoint - 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line service (or equivalent privately owned communication facility), capable of operating at 4800 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary Station, Data Code features

- Modem: 3875 mdl 1

- Line Speed: 7200 bps

▲ Manner of Operation: Point-to-Point

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 7200 bps

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code Features

▲ Manner of Operation: Multipoint - 3135 as Control Station

- △ Communication Line and Modem Facilities: None Specified

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Data Code Features

▲ Manner of Operation: Multipoint - 3135 as Tributary Station

- △ Communication Line and Modem Facilities (Nonswitched): Four-wire, full-duplex, PTT leased line telephone service (or equivalent privately owned communication facility), capable of operating at 7200 bps.

Features Required: Synchronous Data Adapter Type II, Modem Clocking, Tributary station, Data Code features

## 3151 ASCII DISPLAY STATION

### PURPOSE

A stand-alone, high quality, 14-inch, monochrome display station used for displaying up to 3,300 characters, and for entering data into and retrieving data from a host processor. The 3151 provides an asynchronous communication interface with a 7-bit or 8-bit word length, using RS-232-C (CCITT V.24/28) interface expandable to additional RS-422-A (CCITT V.11) interface. It communicates with the 128-character, 7-bit ASCII/ISO code or 256-character, 8-bit ASCII/ISO code in ASCII/ISO communication protocols. The 3151 provides a native mode, 3101 mode and various emulation modes, which allow the 3151 to attach to a variety of host processors. The 3151 native mode is compatible with the native (Canada only) modes of the 3161 and 3162 (<)(Except Canada > mode of the IBM 3161 <), with limitations.

### MODELS

**Model 11:** (Except Canada > 11Y <) (Canada only > 11Y, 11D <) Provides 84-(Canada only > or 85-<)key keyboard and green phosphor.

**Model 31:** (Except Canada and Japan > 31Y <) (Canada only > 31Y, 31D <) (Japan only > 31Y, 31K <) Provides 102-(Canada only > or 103-<)(Japan only > or 104-<)key keyboard and green phosphor.

**Model 41:** (Except Canada and Japan > 41Y <) (Canada only > 41Y, 41D <) (Japan only > 41Y, 41K <) Provides 102-(Canada only > or 103-<)(Japan only > or 104-<)key keyboard and Amber-gold phosphor.

#### Note:

Models 11Y, 31Y, 41Y provide English (US). For Canada, Models 11D, 31D, 41D provide Canadian-French. For Japan, Models 31K, 41K provide Katakana. Except for US English models (11Y/31Y/41Y) with which a cartridge is not an element of a model, a keyboard and a cartridge unique to the language are provided to each of the models.

Upon request from the customer, the special 3151 models with a 1-year warranty are provided. The 1-year warranty model numbers corresponding to the standard 3-year warranty models are:

3-Year Warranty Model	Corresponding 1-year Warranty Model
11X	16X
31X	36X
41X	46X

### DESCRIPTION

The 3151 is designed with 2 elements and a cartridge for emulation features and language support. The video element is a 14-inch flat screen design. The keyboard is connected to the video element with coiled cable and is detachable. The cartridge is of a slim-line design.

The 3151 Model 11X displays 1,920 (80 by 24) and 2,000 (80 by 25) characters. The 3151 Model 31X and 41X display 1,920 (80 by 24), 2,000 (80 by 25), 3,168 (132 by 24), and 3,300 (132 by 25) characters. An alphameric character is represented in a character cell of 9x15 or 9x14 dot matrix. The data displayed uses the 128-characters of the 7-bit ASCII/ISO codes or 256-characters of the 8-bit ASCII/ISO codes and an additional character set containing 24 line drawing graphics, 10 script characters and 10 subscript characters. A line drawing character is represented in a 9x15 or 9x14 dot matrix to create a contiguous line. Character- or Echo- transmission mode provides the capability to transmit a character over a communi-

cation line upon depression of each key. The block transmission mode, selectable at setup time, allows buffered transmission of data.

**Communications:** The use of ASCII (ISO) codes and the asynchronous communication interface allows the 3151 to attach to a variety of host processors. Various communication options are selectable by the customer on the setup menu such as line speed (50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600, 19200, and 38400 bps), parity (None, Odd, Even, Mark, Space), interface (EIA RS-232-C (CCITT V.24/V.28), EIA RS-422-A (CCITT V.11)), word length (7-, 8-bit), operation mode (echo, character, block mode), turnaround character (ETX, EOT, CR, DC3), line control (CRTS, PRTS, IPRTS), stop bit (1, 2), and break signal (170, 500ms).

**Operator Factors:** The 3151 has an etched screen, which minimizes glare and fingerprints. Operator messages are displayed on the bottom (25th or 26th row) of the screen, and provide useful operator information. An audible alarm is provided to alert the operator, and its volume is adjustable by the operator. The video element can be tilted to set the screen angle for the operator. The tilt/swivel stand, an accessory, offers ergonomically designed tilt and swivel mechanism. The cable-connected keyboard can be moved and its slope is selectable.

**Keyboard:** The 3151 keyboard has a low profile with tactile feedback, has a coiled cable, and is detachable from the Video WSE. The Model 11 keyboard offers 84-(Canada only > or 85-<)keys including 12 F-keys (Function-keys). The Model 31X/41X keyboard offers 102-(Canada only > or 103-<)(Japan only > or 104-<)keys including 12 F-keys to shift to Program Attention keys, and a numeric keypad with a line drawing capability, and keycaps are recappable on 31X/41X.

**Input Editing Capability:** Cursor move (up, down, right, left, and home), tab (forward, backward, set and clear), erase (end of line, end of page and end of field), clear (entire page and entire buffer), insert (character and line) and delete (character and line) are provided. Tab erase, insert and delete may be manipulated by field attribute. All characters can be rendered by character or field attributes. A twelve-key numeric keypad and 12 F-keys are provided on the keyboard.

Major characteristics of the 3151 are:

All models:

- Compact design with 2 major elements: Video and keyboard
- 14-inch, etched screen display
- 24 lines or 25 lines of data display plus one line display for operator indicator
- RS-232-C communication with speeds up to 38.4K bps
- Native mode compatible with 3161 (Canada only > and 3162 <) ASCII Display Station
- 10 non-IBM emulations included in (US English) base model
- Bidirectional, smooth and jump scroll
- Concurrent support of character attributes (for blink, non-display, underline, reverse and high intensity) and field attributes (for normal, blink, non-display, underline, reverse, high intensity, protected, numeric and modified data tag)

Model 31/41:

- Green or Amber-gold phosphor colors
- IBM 316X compatible, 102-, 103- or 104-key keyboard
- 12 F-keys shiftable to 36, definable by operator or host
- 3 PA (Program attention) keys
- Customer recappable keytops

## MACHINES

- RS-422-A communication (option) with speeds up to 38.4K bps
- IBM 3101 model 23 emulation
- National Language Models
- A cartridge for National Language support or for additional attachment capabilities
- 80/132-character column display
- Split screen capability (3 horizontal viewports)
- Native mode is superset of 3161

### Model 11:

- Green phosphor
- 84-(Canada only) > or 85-< key keyboard
- 12 F-keys
- 80-column display
- Native mode is subset of 3161

**IBM 3161 Migration/Coexistence:** The native mode of 3151 Model 31/41 is a superset of 3161 ASCII Display Station(Canada only) and 3162 ASCII display Station(<), and provides a migration path for the 3161(Canada only) and 3162(<) users without any software modifications. The native mode of 3151 Model 11 is a subset of the 3161.

**IBM 3101 Compatibility and Migration:** The 3101 emulation mode of Model 31X and 41X provides enhanced 3101 functions and a migration path for 3101 users without any software modifications. When operating in 3101 emulation mode, the 3151 will accept and generate the 3101 Model 23 data stream. There are some operational differences in terms of the screen management facilities. 3151 ASCII Display Station Reference Manual documents these differences.

**Emulation Modes in Models:** 3101 mode of Model 31/41 provides emulation of 3101 Model 23. 10 non-IBM emulation modes of the 3151 (US English) models provide emulation of 10 (US English) non-IBM ASCII terminals (TVI 925/925E/910/910+ /912/920, HZ1500, ADDS VP A2, and ADM 3A/5).

**Emulation Modes in Features:** A Cartridge to emulate IBM and DEC terminals, provided as an optional feature (#8235) on the 3151 Models 31X/41X provides:

- RS-232-C and RS-422-A Communications
- DEC VT220/100/52 modes
- 3151 native mode
- 3101 mode
- Enhanced 3708 Attachment Mode (with US English models only)
- 10 non-IBM modes (with US English models only)
- Mode switch

A Cartridge to emulate Wyse WY-50/50+ terminals, provided as an optional feature (#8505) on the 3151 Models 31Y/41Y (US English) provides:

- WY-50/50+ data stream
- Wyse WY-50/50+ Expand Data Stream for TeleVideo 925E/925/920/912 /910+ /910, Lear Siegler ADM 3A/5, ADDS VP A2, HZ 1500
- 3151 native mode

- 3101 mode
- 10 non-IBM modes

**Data Stream:** In non-emulation mode, the 3151 Model 11Y, 31Y, and 41Y generates an ANSI X3.4 (or ISO 646) data stream.

**Cables:** The customer is responsible for preparation of cables. Many IBM systems provide their own unique cables for 3151 attachment and those systems should be referenced for detail information. A modem cable is provided as an IBM accessory for use in attaching to certain devices (specifically modems) and an I/O cable are provided as an IBM accessory for attaching a 4201 or 4202 Proprinter.

**Auxiliary Port:** An auxiliary interface is provided for attachment of an input or output device with EIA RS-232-C (CCITT V.24/28). The 4201 or 4202 Proprinter may be attached at the Auxiliary Port.

**Communication Interfaces:** The 3151 communicates with a variety of host processors. When using the EIA RS-232-C (CCITT V.24/28) interface, the 3151 can communicate through a modem, to a remote host processor at 50 - 2400 bps, or it can directly attach to a host processor within 12.2m (40.0 ft.) at 50 - 38,400 bps.

When using the EIA RS-422-A (CCITT V.11) interface, the 3151 Models 31X, 41X with a feature cartridge that supports the interface (feature #8235), can communicate with a host processor, without a modem, up to 1,219m (4,000 ft.) at 50 - 38,400 bps depending on the type of the cable used. A shielded communication cable is recommended. A multi-function attachment cable, an accessory, is used to attach a 3151 to the host via IBM Cabling System.

**Communicating through Modem:** When using an external modem through EIA RS-232-C (CCITT V.24/28) interface, the 3151 operates in point-to-point on full-duplex facility at transmission speeds of up to 300, 600, 1200/600, and 2400 bps on nonswitched facilities, (D1, D3, M1, M2, M1D, M2M, P1 and P2). In addition, the 3151 operates on switched facilities at transmission speeds of 50, 75, 110, 134.5, 150, 200, 300, 600 and 1200/600 and 2400 bps in full duplex and half duplex modes, and at 1800 bps in half-duplex mode and at 2400 bps in full-duplex mode. For attachment to the facility P1 or P2, character mode or echo mode will be used. For communication capabilities, product utilization and special features, see M2700 pages. The 3151 provides XON/XOFF Control. The 3151 may be attached to packet switched networks through the PAD complying with the CCITT recommendation X.28 via DCEs with CCITT X.20bis interface.

**Modems:** PTT-mandatory modems complying with CCITT Recommendation (1979) V.24, V.28, ISO Standard 2110 and either CCITT Recommendations V.21, V.22, V.22bis or V.23 may be attached. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. A modem cable is required for the attachment to a modem. As an alternative to a modem attachment, the 3151 may be directly connected to a ROLM CBX at speeds up to 19.2K bps through one of the following devices with RS-232-C (CCITT V.24/28) interface: ROLMphone Datacom Module (DCM), Data Terminal Interface (DTI), rack-mounted version of the DCM or DTI.

## SYSTEM SUPPORT AND PROGRAMMING SUPPORT

The 3151 support is provided by the current version of the following systems and licensed programs. Contact each system for availability and details of system support.

Systems to which 3151 attaches and licensed program	Support System	3151-11	3151-31/41	
		Native mode(*1)	Native mode(*2)	3101 mode
Series/1(*5) with				
- EDX		X	X	X
- TPS		X	X	X

- CF - Store application environment		X	X	X
System/88 with OS, TP, HLL		X	X	X
(Except Canada> 6150 with AIX (Canada only> 6150 with AIX		X	Y	(<)
		Y	Y	(<)
5170 with XENIX		X	X	X
9370 with ASCII subsystem controller and VM/SP, VSE/SP or IX/370		X	X	X
9370 with telecommunications subsystem controller and VM/SP or VSE/SP		X(*3)	X(*3)	X
4361 ICA with VM/SP or VSE/SP		X(*3)	X(*3)	X
8100 with DPCX, DPPX		X(*3)	X(*3)	X(*3)
3708	S/370, 30XX, 43XX, 9370 with MVS/SP, MVS/XA VSE/SP, VM/SP, VM/SP HPO	X	X	X
	System 36/38 with 3274 remote attach- ment support	X	X	X
	8100 with DPPX/SP	X	X	X
	4700 via 4701/4702	X	X	X
7171	30XX, 43XX, 9370 with MVS/SP, MVS/XA VM/SP, VM/SP HPO	X	X	X
3174 asynchronous emulation adapter feature	S/370, 30XX(*4), 43XX, 9370 with MVS/SP, MVS/XA VSE/SP, VM/SP, VM/SP HPO	X	X	X
270X, 370X, 372X with NTO	S/370, 30XX, 43XX, 9370 with MVS/SP, MVS/XA VSE/SP, VM/SP, VM/SP HPO	X(*3)	X(*3)	X(*3)
IX/370 ASCII Control Feature on Series/1	S/370, 30XX, 43XX, 9370 with IX/370			X
YALE IUP on Series/1 or HYAC on 4994 or on Series/1	S/370, 30XX, 43XX, 9370 with MVS/SP, MVS/XA VSE/SP, VM/SP, VM/SP HPO			X

7426	S/370, 30XX, 43XX, 8100			X	
ROLMbridge	System 36/38	X	X		
(Except Canada> 5208	System 36/38	X	Y		<)
(Canada only> 5208	System 36/38	Y	Y		<)

X = Supports the 3151 US English models  
(Except Canada>Y = Supports the 3151 Models 11Y/31Y/41Y/31K/41K<)  
(Canada only>Y = Supports the 3151 Models 11Y/31Y/41Y/11D/31D/41D<)  
\*1 = As an IBM 3161, with limitations  
\*2 = As an IBM 3161  
\*3 = CPT-TWX 33/35 (TTC2) protocol only  
\*4 = The channel attachment model of the 3174 is supported by 308X and 3090 only  
\*5 = Series/1 with Multi-function attachment feature (#1310), or with Feature-programmable 4-line Adapter feature (#2096)

Width: 402mm (15.8 in.)  
Depth: 190mm (7.5 in.)  
Height: 41mm (1.6 in.)  
Weight: 2.1kg

#### Cartridge

Width: 54mm (2.1 in.)  
Depth: 86mm (3.4 in.)  
Height: 3mm (0.1 in.)  
Weight: 0.03kg

**System Attachment:** Series/1, System/88, 9370, and non-IBM mini-computers attach the 3151 with RS-232-C (CCITT V.24/28) interface, or RS-422-A (CCITT V.11) interface (with a feature #8235 on Models 31X, 41X only) both in 50 to 19.2K bps line speed, and via a modem with RS-232-C (CCITT V.24/28) interface in 50 to 2400 bps line speed. IBM Processors attach the 3151, via 270X, 370X, or 3725/6 with RS-232-C (CCITT V.24/28) interface in 50 to 1,200 bps line speed, via 370X/8100, 3725/8100 or 3726/8100 with RS-232-C (CCITT V.24/28) interface in 50 to 2,400 bps (with modem) or 50 to 9,600 bps (without modem) line speed, and via a protocol converter with RS-232-C (CCITT V.24/28) interface in 50 to 19.2K bps line speed. The 3151 can be attached to the 6150/6151 via the 4-Port Asynchronous 232-C Adapter or 4-Port Asynchronous 422-A Adapter, and operate in native mode. The 3151 may be attached to a 4361 processor via the 4361 feature "EIA/CCITT interface" (#3701) with the 4361 feature "Line attachment base for non-clocked modems" (#4696). It may operate at speeds up to 2,400 bps, in 3101 mode and 3151 native mode. The attachment must be via the EIA RS-232-C (CCITT V.24/28) interface, via asynchronous modem with switched or non-switched telephone line, or via direct attachment at distance up to 12m (40 ft.). For direct connection to the 8100 system, the 3.0m (10.0 ft.) Modem Cable must be used, and the length of the 8100 direct connect cable cannot exceed 9.1m (30.0 ft.), thus the total maximum cable length from the 8100 system to the 3151 must be 12.2m (40.0 ft.).

**Printers:** The 3151 has an auxiliary port that can connect an ASCII printer over an RS-232-C direct connection. A print key allows local printing of the screen, while the software commands allow remote printing from a host. For example, the 4201 and 4202 Proprinter may attach via its serial (RS-232-C) interface to the 3151 for direct printing of text-oriented screens (or graphics and text via host programming).

#### Physical Characteristics:

##### Video element

Width: 328mm (12.9 in.)  
Depth: 327mm (12.9 in.)  
Height: 326mm (12.8 in.)  
Weight: 7.6kg

##### Keyboard element (Models 31, 41)

Width: 492mm (19.4 in.)  
Depth: 210mm (8.3 in.)  
Height: 40mm (1.6 in.)  
Weight: 2.5kg

##### Keyboard element (Model 11)

#### SPECIFY

- Low-voltage machine: 100 - 127V; 0.1 kVA; 50/60 Hz; 88 BTU/hr; 1-phase
- High-voltage machine: 200 - 250V; 0.1 kVA; 50 Hz; 88 BTU/hr; 1-phase

#### Environmental Requirements:

Operating: 10 to 40.6C; 8 to 80 percent RH; 26.7 Maximum Wet Bulb

Non-Operating: 10 to 51.7C; 8 to 80 percent RH; 26.7 Maximum Wet Bulb

Storage: 0.6 to 60C; 5 to 80 percent RH; 29.4 Maximum Wet Bulb

Shipment: -20 to 60C; 5 to 100 percent RH; 29.4 Maximum Wet Bulb

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3151 to enhance the availability to the customer. This has been done through the use of Problem Analysis and Solving routines and procedures that are used by the customer.

**Customer Setup (CSU):** The 3151 is designated as a customer setup machine. Setup instructions are shipped with each machine, as the "IBM 3151 ASCII Display Station, Guide to Operations".

#### Customer Responsibilities: The customer is responsible for:

- Adequate site, system, cables and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Physical setup, connection of cables in customer access area, program setting of setup options.
- Determination of the required number of spares.
- Performing Problem Analysis and Resolution using "IBM 3151 ASCII Display Station Guide to Operation".
- (Except Japan> Returning a failing workstation element to an IBM Repair Center (for Customer Carry-in Repair maintenance) with a completed Service Replacement Order Form for repairs, if required.<)

7. Ordering the "IBM 3151 ASCII Display Station Reference Manual" for site planning and preparation work, if required additionally before it is shipped with each machine.
8. Evaluation of the attachment capabilities of the 3151 to the Host Processor at the other end via the modem or Packet/Depacket (PAD) function of the telecommunication network.

**Spare:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3151 units for such use. The number of spare units is dependent upon the number of 3151 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard and a video is shown in the following table:

### Recommended Minimum Number of Spare 3151s:

Number Installed	Recommended Minimum Spare Machines
1 - 50	1
51 - 100	2
101 - 300	3
301 - 500	5
501 - 700	6
701 - 1000	7

The customer should be advised to verify units for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as an individual workstation element where spare elements do not have VPA discount. See "Accessories" for ordering individual element.

**Publications:** Publications in the following list are for all models, unless otherwise remarked.

- (AG only) GA18-2633 (for Models 11Y/31Y/41Y), GA09-0445 (for Models 31D/41D) IBM 3151 ASCII Display Station Guide to Operation
- GA18-2634 IBM 3151 ASCII Display Station Reference Manual
- GA18-2654 IBM 3151 ASCII Display Station, Cartridge to Emulate IBM and DEC Terminals
- GA18-2657 IBM 3151 ASCII Display Station, Cartridge to Emulate Wyse 50/50+
- SY18-2196 IBM 3151 ASCII Display Station Repair Center Maintenance Information
- GX18-2288 (Ten non-IBMs), GX18-2143 (Blank) Keyboard Overlay<
- (A/PG only) GA18-2633 IBM 3151 ASCII Display Station Guide to Operation
- GA18-2634 IBM 3151 ASCII Display Station Reference Manual
- GA18-2654 IBM 3151 ASCII Display Station, Cartridge to Emulate IBM and DEC Terminals
- GA18-2657 IBM 3151 ASCII Display Station, Cartridge to Emulate Wyse 50/50+
- SY18-2196 IBM 3151 ASCII Display Station Repair Center Maintenance Information
- GX18-2288 (Ten non-IBM's), GX18-2143 (Blank) Keyboard Overlay<)

For others, see KWIC Index G320-1621, or specific system bibliography.

### SPECIAL FEATURES

**IBM 3151 Cartridge to emulate Wyse WY-50/50+ terminals (#8505, P/N 81X4456):** (Models 31Y, 41Y, only) Field Installation: Yes. Customer Setup: Yes.

**IBM 3151 Cartridge to emulate IBM and DEC terminals (#8235, P/N 81X4457):** (Models 31Y, 31D, 31K, 41Y, 41D, 41K only) Field Installation: Yes. Customer Setup: Yes.

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

The following accessories can be ordered. By using a P/N, order the Country Direct Marketing Center, or other Supplies Marketing Groups.

**Stand (TIR/Swivel) (P/N 81X4450)**

**Keycaps (P/N 1392098):** Ten ASCII Terminals Emulation.

**Keycaps (P/N 1392508):** Emulating Wyse 50/50+.

**Blank Keycaps (Light) (P/N 1351710):** 60 caps and a keycap removal tool.

**Blank Keycaps (Dark) (P/N 1351728):** 60 caps and a keycap removal tool.

**Clear Lens Caps (60 light and 60 dark) (P/N 6341707):** With paper inserts and a keycap removal tool.

**Keycap Removal Tool (P/N 1351717):** 6 tools.

**Paper Inserts for Clear Lens Keycaps (150 light and 150 dark) (P/N 6341704)**

**(Except Japan > Modem Cable (P/N 6343332):** Inch screws.

**I/O Cable (P/N 6343373)**

**Multi-function Attachment Cable (P/N 8310553) <**

**(Japan only > Modem Cable (P/N 6343333):** Metric screws.

**I/O Cable (P/N 6343373)**

**Multi-function attachment cable (P/N 8310553):** For connection to IBM 5841, 5842 Modem or PTT-Modem the above IBM cable or equivalent must be used. <

### CUSTOMER REPLACEMENT PARTS

The following parts are not covered by the IBM maintenance agreement and must be purchased by the customer when a replacement is needed.

- Field Packing Material:
  - For Video (P/N 83X9316)
  - For Keyboard (Models 31, 41) (P/N 7342889)
  - For Keyboard (Model 11) (P/N 7343197)

### MACHINE ELEMENTS

Elements can be ordered to provide individual element as needed by the customer for the use of the 3151. For shipment, specify Machine Element Number (P/N) at the time of order entry.

Order by parts and supply requisition.

- (Canada only > Models 11Y, 11D, Video (Green), P/N 81X4508
- Models 31Y, 31D, Video (Green), P/N 81X4509
- Models 41Y, 41D, Video (Amber-gold), P/N 81X4519
- Model 11Y, Keyboard-US English (84 key), P/N 1392980
- Model 11D, Keyboard-Canadian French (85 key), P/N 1392981
- Models 31Y, 41Y, Keyboard-US English (102 key), P/N 1392595
- Models 31D, 41D, Keyboard-Canadian French (103 key), P/N 1392597
- All Models, Power cord 2.8m (9 ft.), P/N 6952300

- Models 31Y, 41Y, Cartridge - US English Emulating IBM and DEC, P/N 81X4457
- Models 31Y, 41Y, Cartridge - US English Emulating WY-50/50+, P/N 81X4456
- Model 11D, Cartridge - Canadian French, P/N 81X5460
- Models 31D, 41D, Cartridge - Canadian French, P/N 81X5450
- Models 31D, 41D, Cartridge - Canadian French Emulating IBM and DEC, P/N 81X4467<)
- (Japan only> Model 11Y, Video (Green), P/N 81X4502
- Models 31Y, 31K, Video (Green), P/N 81X4503
- Models 41Y, 41K, Video (Amber-gold), P/N 81X4513
- Model 11Y, Keyboard-US English (84 key), P/N 1392980
- Models 31Y, 41Y, Keyboard-US English (102 key), P/N 1392595
- Models 31K, 41K, Keyboard-Katakana (104 key) P/N 1392598
- All Models, Power cord 2.8m (9 ft.), P/N 6952300
- Models 31Y, 41Y, Cartridge - US English Emulating IBM and DEC, P/N 81X4457
- Models 31Y, 41Y, Cartridge - US English Emulating WY-50/50+, P/N 81X4456
- Models 31K, 41K, Cartridge - Katakana, P/N 81X5454
- Models 31K, 41K, Cartridge - Katakana Emulating IBM and DEC, P/N 81X4466<)
- (Except Canada and Japan> Model 11Y, Video - (Green, Low voltage), P/N 81X4502:
  - Philippines, Taiwan, Bolivia, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama
- Model 11Y, Video - (Green, High voltage), P/N 81X4506:
  - Australia, New Zealand, Hong Kong, Malaysia, Singapore, Indonesia, Chile, Argentina, Paraguay, Peru, Uruguay, Venezuela
- Model 31Y, Video - (Green, Low voltage), P/N 81X4503:
  - Philippines, Taiwan, Bolivia, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama
- Model 31Y, Video - (Green, High voltage), P/N 81X4507:

Australia, New Zealand, Hong Kong, Malaysia, Singapore, Indonesia, Chile, Argentina, Paraguay, Peru, Uruguay, Venezuela

- Model 41Y, Video - (Amber-gold, Low voltage), P/N 81X4513:
  - Philippines, Taiwan, Bolivia, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama
- Model 41Y, Video - (Amber-gold, High voltage), P/N 81X4517:
  - Australia, New Zealand, Hong Kong, Malaysia, Singapore, Indonesia, Chile, Argentina, Paraguay, Peru, Uruguay, Venezuela
- Model 11Y, Keyboard-US English (84 key), P/N 1392980
- Models 31Y, 41Y, Keyboard-US English (102 key), P/N 1392595
- All Models, Power Cord 2.8m (9 ft.):
  - P/N 6952300 - Taiwan, Philippines, Bolivia, Costa Rica, Dominican Republic, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama
  - P/N 6952320 - Indonesia
  - P/N 6952356 - Hong Kong, Singapore, Malaysia
  - P/N 6952311 - Australia, New Zealand
  - P/N 6952291 - Argentina, Uruguay, Paraguay
  - P/N 6952374 - Chile
  - P/N 1838574 - Peru, Venezuela
- Models 31Y, 41Y, Cartridge - US English Emulating IBM and DEC, P/N 81X4457
- Models 31Y, 41Y, Cartridge - US English Emulating WY-50/50+, P/N 81X4456<)

**Maintenance:** Maintenance for individual workstation element is available at IBM Repair Centers or through an IBM Service/Exchange Center at the applicable IBM Hourly Service rates and minimum charges.

## SUPPLIES (NONE)

## 3161 ASCII DISPLAY STATION

### PURPOSE

A stand-alone, high quality, 12-inch, display station used for displaying up to 1,920 characters, and for entering data into and retrieving data from a host processor. The 3161 provides an asynchronous communication interface using a 7-bit (or 8-bit) ASCII/ISO code and an interface for direct attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28) interface. A cable-connected keyboard is provided for operator data input. The 3161 uses the ASCII (ISO) communication protocols and provides a native mode, 3101 mode and various non-IBM emulation modes which allows the 3161 to attach to a variety of host processors including Series/1 and non-IBM mini-computers. The 3161 meets both general industry and unique customer information requirements.

### MODELS

**Model 11:** (Except Canada and Japan>(11Y)<) (Canada only>(11Y, 11D)<) (Japan only>(11Y, 11K)<) With green monitor, provides EIA RS-232-C (CCITT V.24/V.28) interface.

**Model 12:** (Except Canada and Japan>(12Y)<) (Canada only>(12Y, 12D)<) (Japan only>(12Y, 12K)<) With green monitor, provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11).

**Model 21:** (Except Canada and Japan>(21Y)<) (Canada only>(21Y, 21D)<) (Japan only>(21Y, 21K)<) With amber-gold monitor, provides EIA RS-232-C (CCITT V.24/V.28) interface.

**Model 22:** (Except Canada and Japan>(22Y)<) (Canada only>(22Y, 22D)<) (Japan only>(22Y, 22K)<) With amber-gold monitor, provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11).

Note: Mdl's 11Y/12Y/21Y/22Y provide English (US).

(Canada only>Note: Mdl's 11D/12D/21D/22D provide Canadian-French.<)

(Japan only>Note: Mdl 11K/12K/21K/22K provide Katakana.<)

(Canada and Japan only>A keyboard and a cartridge unique to language are provided to each of all models except mdl<) (Canada and Japan only> 11Y/21Y<) (Canada and Japan only> 12Y/22Y.<)

Upon request from the customer, the 3161 is available with a 90-day warranty. Orders are entered in AAS with special model numbers. These special model numbers are for ordering and administrative purposes only. The special model numbers correspond to the standard 3-year warrantied models as follows:

3-Year Warranty Model	Corresponding 90-Day Warranty Model
3161-11X	3161-16X
3161-12X	3161-17X
3161-21X	3161-26X
3161-22X	3161-27X

**Customer Setup (CSU):** The 3161 is designated as a customer setup machine. Setup instructions are shipped with each machine, as the "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312).

### HIGHLIGHTS

The 3161 displays up to 1,920 characters, 24 rows of 80 characters each. An alphanumeric character is represented in an 8x16 contiguous box matrix. The data displayed uses the 128 characters of ASCII/ISO codes and an additional character set containing 24 line drawing graphics, 10 superscript characters and 10 subscript characters.

acters. A line drawing character is represented in a maximum 8x16 dot matrix to create a contiguous line. The character transmission mode provides the capability to transmit a character over a communication line upon depression of each key. The block transmission mode, selectable at setup time, allows buffered transmission mode of data. The 3161 consists of the three Workstation Elements (Video, Logic, and Keyboard) and Cartridge.

**Communications Flexibility:** The use of ASCII (ISO) codes and the asynchronous communication interface allows the 3161 to attach to a variety of host processors. Various communication options are selectable by the customer on the setup menu such as line speed (50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600 and 19,200 bps), parity (none, odd, even, mark, space), interface (EIA RS-232-C (CCITT V.24/V.28), EIA RS-422-A (CCITT V.11)), word length (7, 8-bit), operation mode (echo, character, block mode), turn-around character (ETX, EOT, CR, DC3), line control (CRTS, PRTS, IPRTS), stop bit (1, 2), response delay (0, 100ms) and break signal (170, 500ms).

**Operator Factors:** The 3161 has an etched screen, which minimizes glare and fingerprints. Indicators are displayed on the bottom (25th row) of the screen, and provide useful operator information. An audible alarm is provided to alert the operator, and its volume is adjustable by the operator. The video element can be tilted and swiveled by the pedestal to set the screen angle for the operator. The cable-connected keyboard can be moved and its slope is selectable.

**Input Editing Capability:** Cursor move (up, down, right, left, and home), tab (forward, backward, set and clear), erase (end of line, end of page and entire page), clear (entire page and entire buffer), insert (character and line) and delete (character and line) are provided. Tab erase, insert and delete may be manipulated by field attribute. All characters can be rendered by character or field attributes. A 12-key numeric keypad and 12 Function (F) keys are provided on the keyboard.

Major characteristics of the 3161 are:

- Green or amber-gold phosphor CRT
- Split screen capability (3 horizontal viewports)
- Auto skip
- CRT saver with programmable timer
- Hold (temporarily stop receiving data from the host)
- Block or underlined cursor with blinking option
- Character attributes (for blink, non-display, underline, reverse, high intensity) or field attributes for normal, blink, non-display, underline, reverse, high intensity, protected, numeric and modified data tag
- Function keys redefinable from the terminal, as well as from the host (12 keys with two shifts each)

**Emulation Modes:** Machine modes of 3101 mdl(Canada only> 881 or<) 23 and five non-IBM display terminals (ADM-3A and ADM 5 of Lear Siegler Inc., Viewpoint of Applied Digital Data Systems Inc., Hazeltine-1500 of Hazeltine Corp., and Mdl 910 of TeleVideo Systems Inc.) are provided to emulate these models. The Extended Emulation Feature (#8501) provides the enhanced functions such as 24 Definable Function Keys (set by both host and keyboard), 3 PA keys, Local Print Key, 25th Line On/Off Key, Return Setup to Factory Default, Pacing in Main Port, and Mono/Dual option, in 3101, or five non-emulation modes above. Five TeleVideo's Emulation Feature (#8901) provides the functions to emulate TeleVideo models 910PLUS/912/920/925/925E. In addition, it provides the extended functions such as 32 Definable Function keys (set by both host and keyboard), 3 PA keys, 25th Line On/Off selection, and Mono/Dual case option. All of the emulation above are supported for the 3161 English US models only. There are some operational differences such as keyboard layout and how to set up the machine.

**Cables:** The customer is responsible to prepare cables. Many IBM systems provide their own unique cables for 3161 attachment and those systems should be referenced for detail information. A modem cable is provided as an IBM accessory for use in attaching

to certain devices (specifically modems) and an I/O cable are provided as an IBM accessory for attaching the 4201 Proprinter.

**Auxiliary Port:** An auxiliary interface is provided for attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28). The 4201 Proprinter may be attached at the Auxiliary port.

**Communications:** The 3161 communicates with a variety of host processors. When using the EIA RS-232-C (CCITT V.24/V.28) interface, the 3161 can communicate through a modem, to a remote host processor at 50 - 2400 bps (and at 1800 bps in half-duplex mode), or it can directly (without a modem) attach to a host processor within 12.2m (40.0 ft) at 50 - 19,200 bps.

**Note:** For direct connect to the 8100 system, the 3.0m (10.0 ft) Modem Cable must be used; and the length of the 8100 direct connect cable cannot exceed 9.1m (30.0 ft), thus the total maximum cable length from the 8100 system to the 3161 must be 12.2m (40.0 ft).

When using the EIA RS-422-A (CCITT V.11) interface, the 3161 can communicate with a host processor, without a modem, up to 1,219m (4000 ft) at 50 - 19,200 bps depending on the type of cable used. A shielded communication cable is recommended. Multi-function attachment cable is used to attach a 3161 mdl 12 to the host via IBM Cabling System. The 3161 may be attached to a 4361 processor via the 4361 feature "EIA/CCITT Interface" (#3701) with the 4361 feature "Line Attachment Base for Non-Clocked Modems" (#4696). It may operate at speeds up to 2400 bps, in 3101 mode and 316X native mode. The attachment must be via the EIA RS-232-C (CCITT V.24/V.28) interface, via asynchronous modem with switched or non-switched telephone line, or via direct attachment at a distance up to 12m (40 ft).

**Communicating through Modem** When using an external modem through EIA RS-232-C (CCITT V.24/V.28) interface, the 3161 operates in point-to-point On full-duplex facility at transmission speeds of up to 300, 600 and 1200/600 bps on nonswitched facilities. D1, D3, M1, M2, M1M, M2M, P1 and P2. In addition, the 3161 operates on switched facilities at transmission speeds of 50, 75, 110, 134.5, 150, 200, 300, 600 and 1200/600 bps in full-duplex and half-duplex modes, and at 1800 bps in half-duplex mode and at 2400 bps in full-duplex mode. For attachment to the facility P1 or P2, character mode or echo mode will be used. For communication capabilities, product utilization and special features, see M2700 pages. The 3161 provides XON/XOFF Control. The 3161 may be attached to packet switched networks through the PAD complying with the CCITT recommendation X.28 via DCEs with CCITT X.20 bis interface.

**Modems:** A modem cable is required for the attachment to a modem. 5811-20/28, 5812-10/18 at speeds up to 19,200 bps on facilities GASYN, 5841 and PTT mandatory modems complying with CCITT Recommendations (1979), V.24, V.28, ISO standard 2110 and either CCITT Recommendations V.21, V.22 or V.23 may be attached. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

**Software Support:** The 3161 is supported both in 3161 Native Mode and in 3101 Mode by Series/1, 3798, 3710, 7171 and other hosts that support the CPT-TWX 33/35 ASCII protocols. The 3161 is also supported in 3101 mode by System/88, 8100, and the other IBM hosts that support the 3101 Mdl (Canada only > 881 or < 23). The 3161 support is provided by the current version of the following licensed programs:

System -	Licensed Program	3161 Native Mode	3101 Mode
Series/1	RPS, EDX, CM, CF	-	X
	TPS	X	X
	IOX*	X	X

\* Series/1 5170 System Unit only.

System/88: OS, 3270 Emulation,

8100:	TP, HLL	-	X
S/370, 30XX,	DPCX, DPPX	-	X
4300, and			
9370:			
	DOS/VSE, OS/VSI,		
	MVS/370, MVS/XA,		
	VM/SP and VM/SP		
	HPO via:		
	*3708, 3710, 7171	X	X
	*270X, 370X, 3725/6,		
	4995, 7426, and		
	8100	-	X

In non-emulation mode, the 3161 generates an ANSI X3.4 data stream (English US models only).

**System Attachment:** Series/1, System/88 and Non-IBM Mini Computers attach the 3161 with RS-422-A (CCITT V.11) interface (mdl 12 only), or RS-232-C (CCITT V.24/28) interface both in 50 to 19.2K bps line speed, and via a modem with RS-232-C (CCITT V.24/28) interface in 50 to 2400 bps line speed. IBM Processors attach the 3161, via 270X, 370X, or 3725/6 with RS-232-C (CCITT V.24/28) interface in 50 to 1200 bps line speed, via 370X-8100 or 3725/6-8100 with RS-232-C (CCITT V.24/28) interface in 50 to 2400 bps (with modem) or 50 to 9600 bps (without modem) line speed, and via a protocol converter with RS-232-C (CCITT V.24/28) interface in 50 to 19.2K bps line speed. For connection of the 3161 to 8100, a connection cable of 9.1m (30 ft) or less and a modem cable of 3m (10 ft) must be used. As an alternative to a modem attachment, the 3161 may be directly connected to a ROLM CBX at speeds up to 19.2K bps through one of the following devices with RS-232-C (CCITT V.24/28) interface: Rolmphone Datacom Module (DCK), Data Terminal Interface (DTI), rack-mounted version of the DCM or DTI. The 3161 can be attached to the 6150/6151 via the 4-Port Asynchronous 232C Adapter or 4-Port Asynchronous 422A Adapter, and operate in native mode.

**Keyboard:** The 3161 keyboard, detachable from the Logic WSE, has coiled cable, low profile with tactile feedback, and 102 (Canada only) > or 103 < (Japan only) > or 104 < keys including 12 Function keys shiftable to 24, 3 Program Attention keys, and a numeric keypad with a line drawing capability.

**Printers:** The 3161 has an auxiliary port that can connect an ASCII printer over an RS-232-C direct connection. A print key allows local printing of the screen, while the software commands allow remote printing from a host. For example, the 4201 Proprinter may attach via its serial interface to the 3161 for direct printing of text-oriented screens (or graphics and text via host programming).

**IBM 3101 Compatibility and Migration:** The 3161, when operating in 3101 emulation mode, will accept and generate the 3101 mdl 881 data streams. There are two methods of placing the 3161 into the 3101 emulation mode. The operator may select the 3101 mode during menu setup, or a suitably programmed host may send a "3101 mode" command to 3161. There are some operational differences in terms of the screen management facilities. The 3161/3163 ASCII Display Station Description documents these differences.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, cables and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup, connection of cables in customer access area, program setting of setup options.
4. Determination of the required number of spares.
5. Performing Problem Analysis and Resolution using "IBM 3161/3163 ASCII Display Station Operator Reference and Problem Solving Guide".

## MACHINES

6. (Except Japan > Returning a failing workstation element to an IBM Repair Center (for Customer Carry-In Repair maintenance) with a completed Service Replacement Order Form for repairs, if required. <)
7. Ordering the IBM 3161/3163 ASCII Display Station Description for site planning and preparation work, if required additionally before it is shipped with each machine.
8. Evaluation of the attachment capabilities of the 3161 to the Host Processor at the other end via the modem or Packet/Depacket (PAD) function of the telecommunication network.

**Spare:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3161 units for such use. The number of spare units is dependent upon the number of 3161 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard, a logic, and a video is shown in the following table:

Recommended Minimum Number of Spare 3161s:

Number Installed	Recommended Minimum Spare Machines
1 - 50	1
51 - 100	2
101 - 300	3
301 - 500	5
501 - 700	6
701 - 1000	7

The customer should be advised to verify units for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as an individual workstation element where spare elements do not have VPA discount. See "Accessories" for ordering individual elements.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3161 to enhance the availability to the customer. This has been done through the use of Problem Analysis and Solving routines and procedures that are used by the customer.

**(Except Japan > Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged at IBM's then current hourly service rates and minima. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the Service/Exchange Communication Center (S/ECC). IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer. All on-site assistance is available on an hourly service basis at the applicable hourly rates and terms.

Customer-owned spare elements may be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. On-site assistance is available on an hourly service basis at the applicable hourly rates and terms. <)

### Publications

- (Except Canada and Japan > "IBM 3161/3163 ASCII Display Station Description" (GA18-2310)
- "IBM 3161/3163 ASCII Display Station Operator Reference and Problem Solving Guide" (GA18-2311)
- "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312) <)
- (Canada only > "IBM 3161/3163 ASCII Display Station Description" (GA18-2310) (mdl 11Y/D, 12Y/D)

- "IBM 3161/3163 ASCII Display Station Operator Reference and Problem Solving Guide" (GA18-2311) (mdl 11Y, 12Y), (GA09-0282) (mdl 11D, 12D)
- "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312) (mdl 11Y, 12Y) (GA09-0284) (mdl 11D, 12D) <)
- (Japan only > "IBM 3161/3163 ASCII Display Station Description" (GA18-2310) (mdl 11Y/K, 12Y/K)
- "IBM 3261/3163 ASCII Display Station Operator Reference and Problem Solving Guide" (GA18-2311) (Mdl 11Y/12Y), (GA18-2432) (mdl 11K, 12K)
- "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312), (mdl 11Y, 12Y), (GA18-2433) (mdl 11K, 12K) <)
- "IBM 3161/3163 ASCII Display Station Repair Center Maintenance Information" (SY18-2118)
- "How to Use the Additional Read Command Cartridge on IBM 3161/3163" (GA18-2487)
- Keyboard Overlay (GX18-2143)

For others, see "KWIC Index" (G320-1621) or specific system bibliography.

## SPECIFY

No need to specify the following standard features.

- Power: 100-125V AC, 1-phase, 3-wire, 50/60 Hz; 200-240V AC, 1-phase, 3-wire, 50/60 Hz
- Power Cord: 2.8m (9 ft) cord with nonlocking plug.

## SPECIAL FEATURES

Optional Feature	Feature Code
Additional Read Command	#8001
Extended Emulation	#8501
Five TeleVideo's Emulation	#8901

Limitations: All special features are provided for English US models only.

Field Installation: All special features are field installable. Customer Setup: All special features are designed for customer setup.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The following accessories may be ordered:

By using a P/N, order from the Country Direct Marketing Center, or other Supplies Marketing Groups.

Description	P/N
(Except Japan >	
Modem Cable - inch screws	6343332<)
Wrap Socket	5640724
Tag	5640852
(Except Japan >	
I/O Cable	6343373
Multi-function attachment cable	8310553<)
(Japan only >	
Modem Cable - metric screws	6343333
Wrap Socket	5640724
I/O Cable	6343373
Multi-function attachment cable	8310553<)

For connection to 5841 modem or PTT modem the above modem cable equivalent must be used.

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by the IBM maintenance agreement and must be purchased by the customer when a replacement is needed.

**Order through Branch Office Parts Station and/or Field Part Distribution Centers to NSD Greencastle or the customer directly places orders to the IBM Parts Order Center in Greencastle.**

Description	P/N
Field Packing Material:	
Video	6339511
Logic	6165946
Keyboard	7342889

## MACHINE ELEMENTS

Elements can be ordered to provide individual elements as needed by the customer for the use of the 3161.

**Order Entry:** For shipment, specify Machine Element Number (P/N) at the time of order entry.

### Order by Parts Requisition.

The 3161 elements can be ordered as follows:

To Fit Model	Machine Element	P/N
(Canada only>		
11Y/D,		
12Y/D	Video (green)	83X7939
21Y/D,		
22Y/D	Video (amber-gold)	83X7944
11Y/D,		
21Y/D	Logic	6113000
12Y/D,		
22Y/D	Logic	6113001
11Y,12Y,		
21Y,22Y	Keyboard-English US	1386303
11D,12D,		
21D,22D	Keyboard - Canadian French	1388651
11D,12D,		
21D,22D	Cartridge - Canadian French	6343349
11Y,12Y,		
21Y,22Y	Cartridge - Additional Read Command	6456332
11Y,12Y,		
21Y,22Y	Cartridge - Extended Emulation	6456350
11Y,12Y,		
21Y,22Y	Cartridge - Five TeleVideo's Emulation	6113056
All	Pedestal	6319013
All	Power Cord 2.8m (9 ft)	6952297
<)		
(Japan only>		
11Y/K,		
12Y/K	Video (green)	83X7939
21Y/K,		
22Y/K	Video (amber-gold)	83X7944
11Y/K,		
21Y/K	Logic	6113000
12Y/K,		
22Y/K	Logic	6113001
11Y,12Y,		
21Y,22Y	Keyboard - English US	1386303
11K,12K,		

21K,22K	Keyboard - Katakana	1388650
11K,12K,		
21K,22K	Cartridge - Katakana	6343318
11Y,12Y,		
21Y,22Y	Cartridge - Additional	
	Read Command	6456332
11Y,12Y,		
21Y,22Y	Cartridge - Extended	
	Emulation	6456350
11Y,12Y,		
21Y,22Y	Cartridge - Five	
	TeleVideo's Emulation	6113056
All	Pedestal	6319013
All	Power Cord 2.8m (9 ft)	6952297
<)		
(Except Canada and Japan>		
11Y,12Y	Video (green)	
21Y,22Y	- Philip.,	
	Taiwan,	
	Colombia,	
	Costa Rica,	
	Dominican Rep.,	
	Ecuador, El Salvador,	
	Guatemala, Honduras,	
	Mexico, Panama,	83X7939
	- Bolivia	83X7940
	- Australia,	
	N. Zealand,	
	Indonesia,	
	Singapore,	
	Argentina, Chile,	
	Paraguay, Uruguay,	
	Peru	83X7942
	- Hong Kong,	
	Malaysia,	
	Venezuela	6405274
21Y,22Y	Video (amber-gold)	
	- Taiwan, Philip.,	
	Colombia, Costa	
	Rica, Dominican R.,	
	Ecuador, El Salvador,	
	Guatemala, Honduras,	
	Mexico, Panama	83X7944
	- Bolivia	83X7946
	- Australia, New	
	Zealand, Indonesia,	
	Singapore, Argentina,	
	Chile, Paraguay,	
	Uruguay, Peru	83X7947
	- Hong Kong,	
	Malaysia,	
	Venezuela	83X7945
11Y,21Y	Logic	6113000
12Y,22Y	Logic	6113001
11Y,12Y,		
21Y,22Y	Keyboard - English US	1386303
11Y,12Y,		
21Y,22Y	Cartridge - Additional	
	Read Command	6456332
11Y,12Y,		
21Y,22Y	Cartridge - Extended	
	Emulation	6456350
11Y,12Y,		
21Y,22Y	Cartridge - Five	
	TeleVideo's Emulation	6113056
11Y,12Y,		
21Y,22Y	Pedestal	6319013
11Y,12Y,		
21Y,22Y	Power Cord 2.8m (9 ft)	
	- Taiwan, Philippines,	
	Colombia, Costa Rica,	
	Dominican Rep., Ecuador,	
	El Salvador, Guatemala,	

**MACHINES**

Honduras, Mexico, Panama,	
Bolivia	6952297
- Indonesia	6952317
- Hong Kong, Malaysia,	
Singapore	6952353
- Australia,	
New Zealand,	
Indonesia, Singapore	6952308
- Argentina, Uruguay,	
Paraguay	6952285
- Chile	6952371

- Venezuela, Peru 6952397

Maintenance: Maintenance for individual workstation element is available at IBM Repair Centers or through an IBM Service/Exchange Center at the applicable IBM Hourly Service rates and minimum charges.

**SUPPLIES (NONE)**

## 3162 ASCII DISPLAY STATION

### PURPOSE

A stand-alone, high quality, 14-inch, monochrome display station used for displaying up to 3,696 characters, and for entering data into and retrieving data from a host processor. The 3162 provides an asynchronous communication interface using a 7-bit (or 8-bit) ASCII/ISO code and an interface for direct attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28) interface. A cable-connected keyboard is provided for operator data input. The 3162 uses the ASCII (ISO) communication protocols and provides a native mode, 3101 mode and various non-IBM emulation modes which allow the 3162 to attach to a variety of host processors including the Series/1 and non-IBM mini-computers. The 3162 meets both general industry and unique customer information requirements.

### MODELS

**Model 11:** (Except Canada and Japan>(11Y)<) (Canada only>(11Y, 11D)<) (Japan only>(11Y, 11K)<) Provides EIA RS-232-C (CCITT V.24/V.28) interface, standard keyboard, green monitor.

**Model 12:** (Except Canada and Japan>(12Y)<) (Canada only>(12Y, 12D)<) (Japan only>(12Y, 12K)<) Provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11), standard keyboard, green monitor.

**Model 21:** (Except Canada and Japan>(21Y)<) (Canada only>(21Y, 21D)<) (Japan only>(21Y, 21K)<) Provides EIA RS-232-C (CCITT V.24/V.28) interface, standard keyboard, amber-gold monitor.

**Model 22:** (Except Canada and Japan>(22Y)<) (Canada only>(22Y, 22D)<) (Japan only>(22Y, 22K)<) Provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11), standard keyboard, amber-gold monitor.

**Note:** Models 11Y/12Y/21Y/22Y provide English (US).

**Note:** (Canada only> Models 11D/12D/21D/22D provide Canadian French.<)

**Note:** (Japan only> Models 11K/12K/21K/22K provide Katakana.<)

(Canada and Japan only> A keyboard and a cartridge unique to language are provided to each of models 11D/K, 12D/K, 21D/K, 22D/K.<)

Upon request from the customer, the 3162 special models with a 90-day warranty are provided. The special model numbers correspond to the standard 3-year warranted models as follows:

3-Year Warranty Model	Corresponding 90-day Warranty Model
3162-11X	3162-16X
3162-12X	3162-17X
3162-21X	3162-26X
3162-22X	3162-27X
3162-31X	3162-36X
3162-32X	3162-37X

**Customer Setup (CSU):** The 3162 is designated as a customer setup machine. Setup instructions are shipped with each machine, as the "IBM 3162 ASCII Display Station Setup Instructions".

### HIGHLIGHTS

The 3162 displays up to 1,920 characters (80 x 24), 2,240 characters (80 x 28), 3,168 characters (132 x 24), and 3,696 characters (132 x 28). An alphanumeric character is represented in an 9 x 15 contiguous box matrix in 24 lines display mode and an 9 x 13 contiguous box matrix in 28 lines display mode. The data displayed uses the 128 characters of ASCII/ISO codes and an additional character set containing 24 line drawing graphics, 10 script characters and 10 subscript characters. A line drawing character is represented in a maximum 9x13/9x15 dot matrix to create a contiguous line. The character transmission mode provides the capability to transmit a character over a communication line upon depression of each key. The block transmission mode, selectable at setup time, allows buffered transmission mode of data. The 3162 consists of the three Workstation Elements (Video, Logic, and Keyboard) and Cartridge.

**Communications Flexibility:** The use of ASCII (ISO) codes and the asynchronous communication interface allows the 3162 to attach to a variety of host processors. Various communication options are selectable by the customer on the setup menu such as line speed (50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600 and 19,200 bps), parity (none, odd, even, mark, space), interface (EIA RS-232-C (CCITT V.24/V.28), EIA RS-422-A (CCITT V.11)), word length (7, 8-bit), operation mode (echo, character, block mode), turnaround character (ETX, EOT, CR, DC3), line control (CRTS, PRTS, IPRTS), stop bit (1, 2), response delay (0, 100ms) and break signal (170, 500ms).

**Operator Factors:** The 3162 has an etched screen, which minimizes glare and fingerprints. Indicators are displayed on the bottom (25th or 29th row) of the screen, and provide useful operator information. An audible alarm is provided to alert the operator and its volume is adjustable by the operator. The video element can be tilted and swiveled by the pedestal to set the screen angle for the operator. The cable-connected keyboard can be moved and its slope is selectable.

**Input Editing Capability:** Cursor move (up, down, right, left, and home), tab (forward, backward, set and clear), erase (end of line, end of page and entire page), clear (entire page and entire buffer), insert (character and line) and delete (character and line) are provided. Tab erase, insert and delete may be manipulated by field attribute. All characters can be rendered by character or field attributes. A 12-key numeric keypad and 12 Function (F) keys are provided on the keyboard.

**Migration/coexistence:** The 3162 native mode which is a superset of the 3161, provides a migration path for 3161 users without any software modifications.

The 3101 mdl 23 emulation provides enhanced 3101 functions and a migration path for 3101 users without any software modifications.

Major characteristics of the 3162 are:

- Green or amber phosphor CRT
- Split screen capability (3 horizontal viewports)
- 80/132 character column display
- 24/28 lines display
- CRT saver with programmable timer
- Smooth scroll
- Block or underlined cursor with blinking option
- Character attributes (for blink, non-display, underline, reverse, high intensity) or field attributes for normal, blink, non-display, underline, reverse, high intensity, protected, numeric and modified data tag
- Function keys re-definable from the terminal, as well as from the host (12 keys with two shifts each)
- Customer replaceable keytops

**Emulation Modes:** Machine mode of 3101 (Canada only> mdl 881 or <) mdl 23 is provided to emulate the model. VT200/100/52 mode provided as an optional feature (#8222, cartridge), allows the emulation of VT220, VT100, and VT52. 10 ASCII cartridge (#8922) allows

the emulation of 10 ASCII (TVI 925/925E/910/910 + /912/920, HZ1500, ADDS VPA2, ADM 3A/5). WYSE 50/50 + cartridge (#8502) allows the emulation of TVI 925E/925/910/910 + /912/920, HZ1500, ADDS VPA2, ADM 3A/5 and WYSE 50/50 +.

**Cables:** The customer is responsible to prepare cables. Many IBM systems provide their own unique cables for 3162 attachment and those systems should be referenced for detail information. A modem cable is provided as an IBM accessory for use in attaching to certain devices (specifically modems) and an I/O cable are provided as an IBM accessory for attaching the 4201/4202 Proprinter.

**Auxiliary Port:** An auxiliary interface is provided for attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28). The 4201/4202 Proprinter may be attached at the Auxiliary Port.

**Communications:** The 3162 communicates with a variety of host processors. When using the EIA RS-232-C (CCITT V.24/V.28) interface, the 3162 can communicate through a modem, to a remote host processor at 50 - 2400 bps (1800 bps in half-duplex mode), or it can directly (without a modem) attach to a host processor within 12.2m (40.0 ft) at 50 - 19,200 bps.

**Note:** For direct connect to the 8100 system, the 3.0m (10.0 ft) Modem Cable must be used and the length of the 8100 direct connect cable cannot exceed 9.1m (30.0 ft), thus the total maximum cable length from the 8100 system to the 3162 must be 12.2m (40.0 ft).

When using the EIA RS-422-A (CCITT V.11) interface, the 3162 can communicate with a host processor, without a modem, up to 1,219m (4,000 ft) at 50 - 19,200 bps depending on the type of cable used. A shielded communication cable is recommended. Multi-function attachment cable is used to attach a 3162 mdl 12/22/32/42 to the host via IBM Cabling System. The 3162 may be attached to a 4361 processor via the 4361 feature EIA/CCITT interface (#3701) with the 4361 feature Line Attachment Base for Non-Clocked Modems (#4696) and Start/Stop Line Control (#968X) and operates at speeds up to 2400 bps in 3101 mode and 3162 native mode. The attachment must be via the EIA RS-232-C (CCITT V.24/V.28) interface, via asynchronous modem with switched or non-switched telephone line, or via direct attachment at a distance up to 12m (40 ft).

**Communicating through Modem:** When using an external modem through EIA RS-232-C (CCITT V.24/V.28) interface, the 3162 operates in point-to-point on full-duplex facility at transmission speeds of up to 300, 600 and 1200/600 bps on non-switched facilities. D1, D3, M1, M2, M1M, M2M, P1 and P2. In addition, the 3162 operates on switched facilities at transmission speeds of 50, 75, 110, 134.5, 150, 200, 300, 600 and 1200/600 bps in full-duplex and half-duplex modes, and at 1800 bps in half-duplex mode and at 2400 bps in full-duplex mode. For attachment to the facility P1 or P2, character mode or echo mode will be used. For communication capabilities, product utilization and special features, see M2700 pages. The 3162 provides XON/XOFF Control. The 3162 may be attached to packet switched networks through the PAD complying with the CCITT recommendation X.28 via DCEs with CCITT X.20 bis interface.

**Modems:** A modem cable is required for the attachment to a modem. 5811-20/28, 5812-10/18 at speeds up to 19,200 bps on facilities GASYN, 5841 and PTT mandatory modems complying with CCITT Recommendations (1979), V.24, V.28, ISO Standard 2110 and either CCITT Recommendations V.21, V.22 or V.23 may be attached. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

**Software Support:** The 3162 is supported both in 3162 Native Mode and in 3101 Mode by Series/1, 3708, 3710, 7171 and other hosts that support the CPT-TWX 33/35 ASCII protocols. The 3162 is also supported in 3101 mode by System/88, 8100, and the other IBM hosts that support the 3101 mdl (Canada only > 881 or < 23). The 3162 support is provided by the current version of the following licensed programs:

	Licensed Program	3162 Native (80) (132) Mode	3101 Mode
System			
Series/1	RPS, EDX,		

CM, CF	-	-	X
TPS	X	X	X
IOX*	X	-	X

\* Series/1 5170 System Unit only.

System/88:	OS, 3270 Emulation, TP, HLL	X	-	X
8100:	DPCX, DPPX	-	-	X
S/370, 30XX, and 4300:	DOS/VSE, OS/VSI, MVS/370, MVS/XA, VM/SP and VM/SP HPO via:			
	*7171	X	X	X
	*3708, 3710	X	-	X
	*270X, 370X, 3725/6, 4995, 7426, and			
	8100	-	-	X
	*3174	X	-	X

In non-emulation mode, the 3162 generates an ANSI X3.4 data stream (English US models only).

**System Attachment:** Series/1, System/88 and Non-IBM Mini Computers attach the 3162 with RS-422-A (CCITT V.11) interface (mdl 12 only), or RS-232-C (CCITT V.24/28) interface both in 50 to 19.2K bps line speed, and via a modem with RS-232-C (CCITT V.24/28) interface in 50 to 2400 bps line speed. IBM Processors attach the 3162, via 270X, 370X, or 3725/6 with RS-232-C (CCITT V.24/28) interface in 50 to 1200 bps line speed, via 370X-8100 or 3725/6-8100 with RS-232-C (CCITT V.24/28) interface in 50 to 2400 bps (with modem) or 50 to 9600 bps (without modem) line speed, and via a protocol converter with RS-232-C (CCITT V.24/28) interface in 50 to 19.2K bps line speed. For connection of the 3162 to 8100, a connection cable of 9.1m (30 ft) or less and a modem cable of 3m (10 ft) must be used. As an alternative to a modem attachment, the 3162 may be directly connected to a ROLM CBX at speeds up to 19.2K bps through one of the following devices with RS-232-C (CCITT V.24/28) interface: Rolmphone Datacom Module (DCM), Data Terminal Interface (DTI), rack-mounted version of the DCM or DTI. The 3162 can be attached to the 6150/6151 via the 4-Port Asynchronous 232-C Adapter or 4-Port Asynchronous 422-A Adapter, and operate in native mode.

**Keyboard:** The 3162 keyboard, detachable from the Logic WSE, has coiled cable, low profile with tactile feedback and 102 (Canada only > or 103 <) (Japan only > or 104 <) keys including 12 Function keys shiftable to 24, 3 Program Attention keys, and a numeric keypad with a line drawing capability, and keycaps are replaceable.

**Printers:** The 3162 has an auxiliary port that can connect an ASCII printer over an RS-232-C direct connection. A print key allows local printing of the screen, while the software commands allow remote printing from a host. For example, the 4201 Proprinter may attach via its serial interface to the 3162 for direct printing of text-oriented screens (or graphics and text via host programming).

**IBM 3101 Compatibility and Migration:** The 3162, when operating in 3101 emulation mode, will accept and generate the 3101 (Canada only > mdl 881 <) data streams. There are two methods of placing the 3162 into the 3101 emulation mode. The operator may select the 3101 mode during menu setup, or a suitably programmed host may send a "3101 mode" command to 3162. There are some operational differences in terms of the screen management facilities. The 3161/3163 ASCII Display Station Description documents these differences.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, cables and other vendor preparation.

2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup, connection of cables in customer access area, program setting of setup options.
4. Determination of the required number of spares.
5. Performing Problem Analysis and Resolution using "IBM 3162 ASCII Display Station Operator Reference and Problem Solving Guide".
6. (Except Japan > Returning a failing workstation element to an IBM Repair Center (for Customer Carry-In Repair maintenance) with a completed Service Replacement Order Form for repairs, if required. <)
7. Ordering the "IBM 3162 ASCII Display Station Description" for site planning and preparation work, if required additionally before it is shipped with each machine.
8. Evaluation of the attachment capabilities of the 3162 to the Host Processor at the other end via the modem or Packet/Depacket (PAD) function of the telecommunication network.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3162 units for such use. The number of spare units is dependent upon the number of 3162 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard, a logic, and a video is shown in the following table:

Recommended Minimum Number of Spare 3162s:

Number Installed	Recommended Minimum Spare Machines
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701 - 1000	7

The customer should be advised to verify units for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as an individual workstation element where spare elements do not have VPA discount. See "Accessories" for ordering individual elements.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3162 to enhance the availability to the customer. This has been done through the use of Problem Analysis and Solving routines and procedures that are used by the customer.

**(Except Japan > Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged at IBM's then current hourly service rates and minima. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the Service/Exchange Communication Center (S/ECC). IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer. All on-site assistance is available on an hourly service basis at the applicable hourly rates and terms.

Customer-owned spare elements may be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. On-site assistance is available on an hourly service basis at the applicable hourly rates and terms. <)

## Publications

- "IBM 3162 ASCII Display Station User's Guide" (\*1)
- "IBM 3162 ASCII Display Station Programmer's Guide", GA18-2495
- "IBM 3162 ASCII Display Station Problem Solving Guide" (\*2)
- "IBM 3162 ASCII Display Station Repair Center Maintenance Information", SY18-2163
- "Using the IBM 3162 ASCII Display Station to Emulate the DEC VT220" (\*3)
- "Using the IBM 3162 ASCII Display Station to Emulate Ten ASCII Terminals", GA18-2554
- "Using the IBM 3162 ASCII Display Station to Emulate WYSE 50/50+", GA18-2593

## Note:

- (Except Canada and Japan>
- \*1 = GA18-2493
- \*2 = GA18-2494
- \*3 = GA18-2496<)
- (Canada only>
- \*1 = GA09-0380 (mdl 11D,12D,21D,22D)
- GA18-2493 (mdl 11Y,12Y,21Y,22Y)
- \*2 = GA18-2494 (mdl 11Y,12Y,21Y,22Y)
- GA09-0381 (mdl 11D,12D,21D,22D)
- \*3 = GA09-0382 (mdl 11D,12D,21D,22D)
- GA18-2496 (mdl 11Y,12Y,21Y,22Y)<)
- (Japan only>
- \*1 = N: GA18-2493 (mdl 11Y/K,12Y/K, 21Y/K,22Y/K)
- \*2 = N: GA18-2494 (mdl 11Y/K,12Y/K, 21Y/K,22Y/K)
- \*3 = GA18-2496 (mdl 11Y,12Y,21Y,22Y)
- N: GA18-2496 (mdl 11K,12K,21K, 22K)<)

## SPECIFY

- Power: 100-125V AC, 1-phase, 3-wire, 50/60 Hz; 200-240V AC, 1-phase, 3-wire, 50/60 Hz
- Power Cord: 2.8m (9 ft) cord is provided with all models.

**Note:** No specifics are required on orders. These will be defaulted by country number.

## SPECIAL FEATURES

Optional Feature	Feature Code
VT220 Emulation	#8222
WYSE 50/50+ Emulation	#8502
10 ASCII Emulation	#8922

Limitations: VT220 Emulation (#8222/#8232) is provided for mdl 1XX/2XX only.

Field Installation: All special features are field installable. Customer Setup: All special features are designed for customer setup.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The following accessories may be ordered:

By using a P/N, order from the Country Direct Marketing Center or other Supplies Marketing Groups.

Description P/N

## MACHINES

Blank keycaps - light (60 caps) and a keycap removal tool	1351710	21D,22D	Cartridge - Canadian French	65X0042
Blank keycaps - dark (60 caps) and a keycap removal tool	1351728	11Y,12Y, 21Y,22Y	Cartridge - VT220 Emulation	65X0016
Clear lens caps - with paper inserts (60 light and 60 dark) and a keycap removal tool	6341707	11D,12D, 21D,22D	Cartridge - VT220 Emulation	65X0317
Keycap removal tool (6 tools)	1351717	11Y,12Y, 21Y,22Y	Cartridge - 10 ASCII Emulation	65X0089
Paper Inserts for clear lens keycaps (150 light and 150 dark)	6341704	11Y,12Y 21Y,22Y	Cartridge - WYSE 50/50+ Emulation	65X0090
(Except Japan>		<)		
Modem Cable - inch screws	6343332	(Japan only>		
I/O Cable	6343373	11Y/K,		
Multi-function attachment cable	8310553<)	12Y/K	Video (green)	65X0111
(Japan only>		21Y/K,	Video (amber)	65X0122
Modem Cable - metric screws	6343333	22Y/K		
Wrap Socket	5640724	11Y/K,	Logic	65X0000
I/O Cable	6343373	21Y/K		
Multi-function attachment cable	8310553<)	12Y/K,	Logic	65X0001
		22Y/K		
		11Y,12Y,	Keyboard - English US	1390670
		21Y,22Y		
		11K,12K,	Keyboard - Katakana	1391684
		21K,22K		
		11K,12K,	Cartridge - Katakana	65X0046
		21K,22K		
		11Y,12Y,	Cartridge - VT220 Emulation	65X0016
		21Y,22Y		
		11K,12K,	Cartridge - VT220 Emulation	65X0088
		21K,22K		
		All	Power Cord 2.8m (9 ft)	6952297
		<)		
		(Except Canada and Japan>		
		11Y,12Y,	Video (green)	
			- Philip.,	
			Taiwan,	
			Colombia,	
			Costa Rica,	
			Dominican Rep.,	
			Ecuador, El Salvador,	
			Guatemala, Honduras,	
			Mexico, Panama,	
			Bolivia	65X0111
			- Australia,	
			N. Zealand,	
			Indonesia,	
			Singapore,	
			Argentina, Chile,	
			Paraguay, Uruguay,	
			Peru,	
			Hong Kong,	
			Malaysia,	
			Venezuela	65X0105
		21Y,22Y	Video (amber)	
			- Taiwan, Philip.,	
			Colombia, Costa	
			Rica, Dominican R.,	
			Ecuador, El Salvador,	
			Guatemala, Honduras,	
			Mexico, Panama,	
			Bolivia	65X0122
			- Australia, New	
			Zealand, Indonesia,	
			Singapore, Argentina,	
			Chile, Paraguay,	
			Uruguay, Peru,	
			Hong Kong,	

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by the IBM maintenance agreement and must be purchased by the customer when a replacement is needed.

Description	P/N
Field Packing Material:	
Video	69X8186
Logic	6165946
Keyboard	7342889

## MACHINE ELEMENTS

Elements can be ordered to provide individual elements as needed by the customer for the use of the 3162.

**Order Entry:** For shipment, specify Machine Element Number (P/N) at the time of order entry.

The 3162 elements can be ordered as follows:

Order by parts and supply requisition.

To Fit Model	Machine Element	P/N
(Canada only>		
11Y/D,		
12Y/D	Video (green)	65X0103
21Y/D,		
22Y/D	Video (amber)	65X0120
11Y/D,		
21Y/D	Logic	65X0000
12Y/D,		
22Y/D	Logic	65X0001
11Y,12Y,		
21Y,22Y	Keyboard-English US	1390670
11D,12D,		
21D,22D	Keyboard - Canadian French	1391683
11D,12D,		

## MACHINES

M 3162.5  
MAY 87

	Malaysia,		
	Venezuela	65X0125	
11Y,21Y	Logic	65X0000	
12Y,22Y	Logic	65X0001	
11Y,12Y,			
21Y,22Y	Keyboard - English US	1390670	
11Y,12Y,			
21Y,22Y	Cartridge - VT220		
	Emulation	65X0016	
11Y,12Y,			
21Y,22Y	Power Cord 2.8m (9 ft)		
	- Taiwan, Philippines,		
	Colombia, Costa Rica,		
	Dominican Rep., Ecuador,		
	El Salvador, Guatemala,		
	Honduras, Mexico, Panama,		
	Bolivia	6952297	
	- Indonesia	6952317	
	- Hong Kong, Malaysia,		

Singapore	6952353
- Australia,	
New Zealand,	
Indonesia, Singapore	6952308
- Argentina, Uruguay,	
Paraguay	6952285
- Chile	6952371
- Venezuela, Peru	6952397

<)

**Maintenance:** Maintenance for individual workstation element is available at IBM Repair Centers or through an IBM Service/Exchange Center at the applicable IBM Hourly Service rates and minimum charges.

## SUPPLIES (NONE)

## 3163 ASCII DISPLAY STATION

### PURPOSE

A stand-alone, high quality, 12-inch, monochrome display station used for displaying up to 1,920 characters, and for entering data into and retrieving data from a host processor. The 3163 provides an asynchronous communication interface using a 7-bit (or 8-bit) ASCII/ISO code and an interface for direct attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28) interface. A cable-connected keyboard is provided for operator data input. The 3163 provides the advanced editing functions and is upward compatible from the 3161 native mode. The 3163 uses the ASCII (ISO) communication protocols and provides a native mode, 3101 mode, VT-100/52 mode and TeleVideo 950 mode, which allow the 3163 to attach to a variety of host processors including Series/1 and non-IBM mini-computers. The 3163 meets both general industry and unique customer information requirements.

### MODELS

**Model 11** (Except Canada and Japan > 11Y <) (Canada only > 11Y, 11D <) (Japan only > 11Y, 11K <): With green monitor, provides EIA RS-232-C (CCITT V.24/V.28) interface.

**Model 12** (Except Canada and Japan > 12Y <) (Canada only > 12Y, 12D <) (Japan only > 12Y, 12K <): With green monitor, provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11).

**Model 21** (Except Canada and Japan > 21Y <) (Canada only > 21Y, 21D <) (Japan only > 21Y, 21K <): With amber-gold monitor, provides EIA RS-232-C (CCITT V.24/V.28) interface.

**Model 22** (Except Canada and Japan > 22Y <) (Canada only > 22Y, 22D <) (Japan only > 22Y, 22K <): With amber-gold monitor, provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11).

Note: Mdl's 11Y/12Y/21Y/22Y provide English (US).

(Canada only > Mdl's 11D/12D/21D/22D provide Canadian-French. <)

(Japan only > Note: Mdl's 11K/12K/21K/22K provide Katakana. <)

(Canada and Japan only > A keyboard and a cartridge unique to language are provided to each of all models except mdl <) (Canada and Japan only > 11Y/21Y <) (Canada and Japan only > 12Y/22Y. <)

Upon request from the customer, the 3163 is available with a 90-day warranty. Orders are entered in AAS with special model numbers. These special model numbers are for ordering and administrative purposes only. The special model numbers correspond to the standard 3-year warranted models as follows:

3-Year Warranty Model	Corresponding 90-day Warranty Model
3163-11X	3163-16X
3163-12X	3163-17X
3163-21X	3163-26X
3163-22X	3163-27X
3163-86X	3163-Z6X

**Customer Setup (CSU):** The 3163 is designated as a customer setup machine. Setup instructions are shipped with each machine, as the "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312).

### HIGHLIGHTS

The 3163 displays up to 1,920 characters, 24 rows of 80 characters each. An alphanumeric character is represented in an 8 x 16 contig-

uous box matrix. The data displayed uses the 128 characters of ASCII/ISO codes and an additional character set containing 24 line drawing graphics, 10 superscript characters and 10 subscript characters. A line drawing character is represented in a maximum 8 x 16 dot matrix to create a contiguous line. The character transmission mode provides the capability to transmit a character over a communication line upon depression of each key. The block transmission mode, selectable at setup time, allows buffered transmission mode of data. The 3163 consists of the three Workstation Elements (Video, Logic, and Keyboard) and Cartridge.

**Communications Flexibility:** The use of ASCII (ISO) codes and the asynchronous communication interface allows the 3163 to attach to a variety of host processors. Various communication options are selectable by the customer on the setup menu such as line speed (50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600 and 19,200 bps), parity (none, odd, even, mark, space), interface (EIA RS-232-C (CCITT V.24/V.28), EIA RS-422-A (CCITT V.11)), word length (7, 8-bit), operation mode (echo, character, block mode), turn-around character (ETX, EOT, CR, DC3), line control (CRTS, PRTS, IPRTS), stop bit (1, 2), response delay (0, 100ms) and break signal (170, 500ms).

**Operator Factors:** The 3163 has an etched screen, which minimizes glare and fingerprints. Indicators are displayed under the divider scan on the bottom (25th row) of the screen, and provide useful operator information. An audible alarm is provided to alert the operator, and its volume is adjustable by the operator. The video element can be tilted and swiveled by the pedestal to set the screen angle for the operator. The cable-connected keyboard can be moved and its slope is selectable.

**Input Editing Capability:** Cursor move (up, down, right, left, and home), tab (forward, backward, set and clear), erase (end of line, end of page and entire page), clear (entire page and entire buffer), insert (character and line) and delete (character and line) are provided. Tab erase, insert and delete may be manipulated by field attribute. All characters can be rendered by character or field attributes. A 12-key numeric keypad and 12 Function (F) keys are provided on the keyboard.

Major characteristics of the 3163 are:

- Green or amber-gold phosphor CRT
- Windowing (up/down/ left/right)
- Split screen capability (viewports, paging, partitioning)
- Vertical smooth scroll
- Auto skip
- Divider scan
- CRT saver with programmable timer
- Hold screen (stop scrolling temporarily)
- Block or underlined cursor with blinking option
- Block LRC (Longitudinal Redundancy Checking)
- Host access to the indicator row
- Character attributes for blink, non-display, underline, reverse, high intensity
- Field attributes for normal, blink, non-display, underline, reverse, high intensity, protected, numeric, right justify with zero or space, must enter and auto send
- Line attributes for double high/double wide characters
- Re-definable keyboard layout and customer replaceable keytops
- 12 Function (F) keys redefinable from the terminal, as well as from the host (12 keys with two shifts each)
- 7680-characters buffer
- Host-loadable characters or patterns of up to 94
- Bidirectional auxiliary port

**Emulation Modes:** A machine mode to emulate 3101 mdl (Canada only > 881 or <) 23 is provided. VT 100/52 mode, provided as an optional feature, allows the emulation of the DEC VT 100, and VT 52 mode of DEC VT 100. TeleVideo 950 Mode, also provided as an optional feature, allows the emulation of TeleVideo 950. These emulation modes of optional features are provided for English US models only.

## MACHINES

**Cables:** The customer is responsible to prepare cables. Many IBM systems provide their own unique cables for 3163 attachment and those systems should be referenced for detail information. A modem cable is provided as an IBM accessory for use in attaching to certain devices (specifically modems) and I/O cable are provided as an IBM accessory for attaching the 4201 Proprinter.

**Auxiliary Port:** An auxiliary interface is provided for attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28). The 4201 Proprinter may be attached to the Auxiliary Port.

**Communications:** The 3163 communicates with a variety of host processors. When using the EIA RS-232-C (CCITT V.24/V.28) interface, the 3163 can communicate, through a modem, to a remote host processor at 50 - 1200 bps (and at 1800 bps in half-duplex mode), or it can directly (without a modem) attach to a host processor within 12.2m (40.0 ft) at 50 - 19,200 bps.

**Note:** For direct connect to the 8100 system, the 3.0m (10.0 ft) Modem Cable must be used; and the length of the 8100 direct connect cable cannot exceed 9.1m (30.0 ft), thus the total maximum cable length from the 8100 system to the 3163 must be 12.2m (40.0 ft).

When using the EIA RS-422-A (CCITT V.11) interface, the 3163 can communicate with a host processor, without a modem, up to 1,219m (4000 ft) at 50 - 19,200 bps depending on the type of cable used. A shielded communication cable is recommended. Multi-function attachment cable is used to attach a 3163 mdl 12 to the host via IBM Cabling System. The 3163 may be attached to a 4361 processor via the 4361 feature "EIA/CCITT Interface" (#3701) with the 4361 feature "Line Attachment Base For Non-Clocked Modems" (#4696). It may operate at speeds up to 2400 bps, in 3101 mode and 316X native mode. The attachment must be via the EIA RS-232-C (CCITT V.24/V.28) interface, via asynchronous modem with switched or non-switched telephone line, or via direct attachment at distance up to 12m (40 ft).

**Communicating through Modem** When using an external modem through EIA RS-232-C (CCITT V.24/V.28) interface, the 3163 operates in point-to-point On full-duplex facility at transmission speeds of up to 300, 600 and 1200/600 bps on non-switched facilities. D1, D3, M1, M2, M1M, M2M, P1 and P2. In addition, the 3163 operates on switched facilities at transmission speeds of 50, 75, 110, 134.5, 150, 200, 300, 600 and 1200/600 bps in full-duplex and half-duplex modes, and at 1800 bps in half-duplex mode and at 2400 bps in full-duplex mode. For attachment to the facility P1 or P2, character mode or echo mode will be used. For communication capabilities, product utilization and special features, see M2700 pages. The 3163 provides XON/XOFF Control. The 3163 may be attached to packet switched networks through the PAD complying with the CCITT recommendation X.28 via DCEs with CCITT X.20 bis interface.

**Modems:** A modem cable is required for the attachment to a modem. 5811-20/28, 5812-10/18 at speeds up to 19,200 bps on facilities GASYN, 5841 and PTT mandatory modems complying with CCITT Recommendations (1979), V.24, V.28, ISO standard 2110 and either CCITT Recommendations V.21, V.22 or V.23 may be attached. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

**Software Support:** The 3163 is supported both in 3163 Native Mode and in 3101 Mode by Series/1, 3708, 3710, 7171 and other hosts that support the CPT-TWX 33/35 ASCII protocols. The 3163 is also supported in 3101 mode by System/88, 8100, and the other IBM hosts that support the 3101 Mdl(Canada only> 881 or<) 23. The 3163 support is provided by the current version of the following licensed programs:

System -	Licensed Program	3163 Native Mode	3101 Mode
Series/1	RPS, EDX, CM, CF, TPS, IOX*	- X X	X X X
System/88:	OS, 3270 Emulation,		

8100:	TP, HLL	-	X
S/370,	DPCX, DPPX	-	X
30XX, and			
4300:	DOS/VSE, OS/VSI, MVS/370, MVS/XA, VM/SP and VM/SP HPO via:		
	*3708, 3710, 7171	X	X
	*270X, 370X,		
	3725/6, 4995,		
	7426, and 8100	-	X

\* Series/1 5170 System Unit only.

In non-emulation mode, the 3163 generates an ANSI X3.4 data stream (English US model only).

**System Attachment:** Series/1, System/88 and Non-IBM Mini Computers attach the 3163 with RS-422-A (CCITT V.11) interface (mdl 12 only), or RS-232-C (CCITT V.24/V.28) interface both in 50 to 19.2K bps line speed, and via a modem with RS-232-C (CCITT V.24/V.28) interface in 50 to 1200 bps line speed. IBM Processors attach the 3163, via 270X, 370X, or 3725/6 with RS-232-C (CCITT V.24/V.28) interface in 50 to 1200 bps line speed, via 370X-8100 or 3725/6-8100 with RS-232-C (CCITT V.24/V.28) interface in 50 to 1200 bps (with modem) or 50 to 9600 bps (without modem) line speed, and via a protocol converter with RS-232-C (CCITT V.24/V.28) interface in 50 to 19.2K bps line speed. For connection of the 3163 to 8100, a connection cable of 9.1m (30 ft) or less and a modem cable of 3m (10 ft) must be used. As an alternative to a modem attachment, the 3163 may be directly connected to a ROLM CBX at speeds up to 19.2K bps through one of the following devices with RS-232-C (CCITT V.24/V.28) interface: Rolmphone Datacom Module (DCM), Data Terminal Interface (DTI), rack-mounted version of the DCM or DTI. The 3163 can be attached to the 6150/6151 via its 4-Port Asynchronous 232-C Adapter or 4-Port Asynchronous 422-A Adapter, and operate in native mode as the 3161.

**Keyboard:** The 3163 keyboard, detachable from the Logic WSE, has coiled cable, low profile with tactile feedback, and 102 (Canada only> or 103<) (Japan only> or 104<) keys including 12 Function keys shiftable to 24, 3 Program Attention keys, and a numeric keypad with a line drawing capability. 41 keys are redefinable by swapping the function of the two keys, copying from one key to another, deleting a function from the keyboard and setting a default function. Keycaps are also changeable.

**Printers:** The 3163 has an auxiliary port that can connect an ASCII printer over an RS-232-C direct connection. A print key allows local printing of the screen, while the software commands allow remote printing from a host. For example, the 4201 Proprinter may attach via its serial interface to the 3163 for direct printing of text-oriented screens (or graphics and text via host programming).

**IBM 3101 Compatibility and Migration:** The 3163, when operating in 3101 emulation mode, will accept and generate the 3101 mdl 881 data streams. There are two methods of placing the 3163 into the 3101 emulation mode. The operator may select the 3101 mode during menu setup, or a suitably programmed host may send a "3101 mode" command to 3163. There are some operational differences in terms of the screen management facilities. The 3161/3163 ASCII Display Station Description documents these differences.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, cables and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup, connection of cables in customer access area, setting of setup and select options.

4. Determination of the required number of spares.
5. Performing Problem Analysis and Resolution using IBM 3161/3163 ASCII Display Station Operator Reference and Problem Solving Guide.
6. (Except Japan > Returning a failing workstation element to an IBM Repair Center (for Customer Carry-In Repair maintenance) with a completed Service Replacement Order Form for repairs, if required. <)
7. Ordering the IBM 3161/3163 ASCII Display Station Description for site planning and preparation work, if required additionally before it is shipped with each machine.
8. Evaluation of the attachment capabilities of the 3163 to the Host Processor at the other end via the modem or Packet/Depacket (PAD) function of the telecommunication network.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3163 units for such use. The number of spare units is dependent upon the number of 3163 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard, a logic, and a video is shown in the following table:

Recommended Minimum Number of Spare 3163s:

Number Installed	Recommended Minimum Spare Machines
1 - 50	1
51 - 100	2
101 - 300	3
301 - 500	5
501 - 700	6
701 - 1000	7

The customer should be advised to verify units for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as an individual workstation element where spare elements do not have VPA discount. See "Accessories" for ordering individual elements.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3163 to enhance the availability to the customer. This has been done through the use of Problem Analysis and Solving routines and procedures that are used by the customer. See "Customer Responsibilities".

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged at IBM's then current hourly service rates and minima. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the Service/Exchange Communication Center (S/ECC). IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer. All on-site assistance is available on an hourly service basis at the applicable hourly rates and terms.

Customer-owned spare elements may be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. On-site assistance is available on an hourly service basis at the applicable hourly rates and terms.

#### Publications

- (Except Canada and Japan > "IBM 3161/3163 ASCII Display Station Description" (GA18-2310)

- "IBM 3161/3163 ASCII Display Station Operator Reference and Problem Solving Guide" (GA18-2311)
- "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312) <
- (Canada only > "IBM 3161/3163 ASCII Display Station Description" (GA18-2310) (mdl 11Y/D, 12Y/D)
- "IBM 3161/3163 ASCII Display Station Operator Reference and Problem Solving Guide" (GA18-2311) (mdl 11Y, 12Y), (GA09-0282) (mdl 11D, 12D)
- "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312) (mdl 11Y, 12Y) (GA09-0284) (mdl 11D, 12D) <
- (Japan only > "IBM 3161/3163 ASCII Display Station Description" (GA18-2310) (mdl 11Y/K, 12Y/K)
- "IBM 3261/3163 ASCII Display Station Operator Reference and Problem Solving Guide" (GA18-2311) (mdl 11Y/12Y), (GA18-2432) (mdl 11K, 12K)
- "IBM 3161/3163 ASCII Display Station Setup Instructions" (GA18-2312), (mdl 11Y, 12Y), (GA18-2433) (mdl 11K, 12K) <
- "IBM 3161/3163 ASCII Display Station Repair Center Maintenance Information" (SY18-2118)
- "Using the IBM 3163 ASCII Display Station to Emulate the DEC VT100/52" (GA18-2313)
- "Using the IBM 3163 ASCII Display Station to Emulate the TeleVideo Mdl 950" (GA18-2314)
- "How to Use the Additional Read Command Cartridge on IBM 3161/3162" (GA18-2487) Keyboard Overlay (GX TeleVideo Mdl 950, (GA18-2314)) Keyboard Overlay (GA18-2143)
- Keyboard Overlay (GA18-2143)

For others, see "KWIC Index" (G320-1621) or specific system bibliography.

#### SPECIFY

- Power: 100-125V AC, 1-phase, 3-wire, 50/60 Hz. 200-240V AC, 1-phase, 3-wire, 50/60 Hz.
- Power Cord: 2.8m (9 ft) cord with nonlocking plug.

#### SPECIAL FEATURES

Optional Features	Feature Code
Additional Read Command	#8003
VT 100/52 Emulation	#8103
TeleVideo 950 Emulation	#8953

Limitations: All special features are provided for English US models only.

Field Installation: All special features are field installable.

Customer Setup: All special features are designed for customer setup.

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

The following accessories may be ordered:

By using a P/N, order from the Country Direct Marketing Center, or other Supplies Marketing Groups.

Description	P/N
Blank keycaps - light (60 caps) and a keycap removal tool	1351710
Blank keycaps - dark (60 caps) and a keycap removal tool	1351728
Clear lens cap - with paper inserts (60 light and 60 dark)	6341707

## MACHINES

and a keycap removal tool  
Keycap removal tool (6 tools) 1351717  
Paper Inserts for clear lens 6341704  
keycaps (150 light and 150  
dark) and keycap removal tool  
(Except Japan>  
Modem Cable - inch screws 6343332<)  
Wrap Socket 5640724  
Tag 5640852  
(Except Japan>  
I/O Cable 6343373  
Multi-function attachment  
cable 8310553<)  
(Japan only>  
Modem Cable - metric screws 6343333  
Wrap Socket 5640724  
I/O Cable 6343373  
Multi-function attachment  
cable 8310553<)

For connection to 5841 modem or PTT modem the above IBM cable  
or equivalent must be used.

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by the IBM maintenance  
agreement and must be purchased by the customer when a re-  
placement is needed.

Order through Branch Office Parts Station and/or Field Part Distrib-  
ution Centers to NSD Greencastle or the customer directly places  
orders to the IBM Parts Order Center in Greencastle.

Description	P/N
Field Packing Material:	
Video	6339511
Logic	6165946
Keyboard	7342889

## MACHINE ELEMENTS

Elements can be ordered to provide individual elements as needed  
by the customer for the use of the 3163.

**Order Entry:** For shipment, specify Machine Element Number (P/N)  
at the time of order entry. Order by Parts Requisition.

The 3163 elements can be ordered as follows:

To Fit Model	Machine Element	P/N
(Canada only>		
11Y/D,		
12Y/D	Video (green)	83X7939
21Y/D,		
22Y/D	Video (amber-gold)	83X7944
All	Video Cable	6165557
11Y/D,		
21Y/D	Logic	6113002
12Y/D,		
22Y/D	Logic	6113003
11Y,12Y,		
21Y,22Y	Keyboard-English US	1386304
11D,12D,		
21D,22D	Keyboard - Canadian French	1388704
11D,12D,		
21D,22D	Cartridge - Canadian French	6343350
11Y,12Y,		

21Y,22Y	Cartridge - VT100/52 Emulation	6113006
11Y,12Y,		
21Y,22Y	Cartridge - TeleVideo 950 Emulation	6113021
11Y,12Y,		
21Y,22Y	Cartridge - Additional Read Command	6456333
All	Pedestal	6319013
All	Power Cord 2.8m (9 ft)	6952297
<)		
(Japan only>		
11Y/K,		
12Y/K	Video (green)	83X7939
21Y/K,		
22Y/K	Video (amber-gold)	83X7944
11Y/K,		
21Y/K	Logic	6113002
12Y/K,		
22Y/K	Logic	6113003
11Y,12Y,		
21Y,22Y	Keyboard-English US	1386304
11K,12K,		
21K,22K	Keyboard-Katakana	1388703
11K,12K,		
21K,22K	Cartridge-Katakana	6343319
11Y,12Y,		
21Y,22Y	Cartridge-VT100/52 Emulation	6113006
11Y,12Y,		
21Y,22Y	Cartridge-TeleVideo 950 Emulation	6113021
11Y,12Y,		
21Y,22Y	Cartridge-Additional Read Command	6456333
All	Pedestal	6319013
All	Power Cord 2.8m (9 ft)	6952297
<)		
(Except Canada and Japan>		
11Y,12Y	Video	
	- Philip.,Taiwan, Colombia,Costa Rica, Dominican Rep., Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama	83X7939
	- Bolivia	83X7940
	- Australia, N. Zealand, Indonesia, Singapore, Argentina, Chile, Paraguay, Uruguay	
	Peru	83X7942
	- Hong Kong, Malaysia, Venezuela	6405274
21Y,22Y	Video (amber-gold)	
	- Taiwan,Philip., Colombia,Costa Rica, Dominican R., Ecuador,El Salvador, Guatemala,Honduras, Mexico,Panama,	83X7944
	- Bolivia	83X7946
	- Australia, New Zealand, Indonesia,Singapore, Argentina,Chile, Paraguay,Uruguay,	
	Peru	83X7947

## MACHINES

M 3163.5  
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	- Hong Kong,	
	Malaysia,	
	Venezuela	83X7945
11Y,21Y	Logic	6113002
12Y,22Y	Logic	6113003
11Y,12Y,		
21Y,22Y	Keyboard-English US	1386304
11Y,12Y,		
21Y,22Y	Cartridge -	
	VT100/52 Emulation	6113006
11Y,12Y,		
21Y,22Y	Cartridge - TeleVideo	
	950 Emulation	6113021
11Y,12Y,		
21Y,22Y	Cartridge - Additional	
	Read Command	6456333
11Y,12Y,		
21Y,22Y	Pedestal	6319013
11Y,12Y,		
21Y,22Y	Power Cord 2.8m (9 ft)	
	- Taiwan, Philip.,	
	Colombia, Costa Rica,	
	Dominican Rep., Ecuador,	
	El Salvador, Guatemala,	

Honduras, Mexico,	
Panama, Bolivia	6952297
- Indonesia	6952317
- Hong Kong,	
Malaysia,	
Singapore	6952353
- Australia,	
New Zealand,	
Indonesia,	
Singapore	6952308
- Argentina,	
Uruguay,	
Paraguay	6952285
- Chile	6952371
- Venezuela, Peru	6952397

<)

Maintenance: Maintenance for individual workstation element is available at IBM Repair Centers or through an IBM Service/Exchange Center at the applicable IBM Hourly Service rates and minimum charges.

## SUPPLIES (NONE)

## 3164 COLOR ASCII DISPLAY STATION

### PURPOSE

A stand-alone, high quality, 14-inch, color display station used for displaying up to 1,920 characters, and for entering data into and retrieving data from a host processor. The 3164 provides an asynchronous communication interface using a 7-bit (or 8-bit) ASCII/ISO code and an auxiliary interface for direct attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28) interface. A cable-connected keyboard is provided for operator data input. The 3164 provides the advanced editing functions as the 3163 and is upward compatible from the 3161/3163 native modes and displays both the foreground and the background in up to 8 colors. The 3164 meets the general and unique ASCII display requirements.

### MODELS

**Model 11** (Except Canada and Japan > 11Y <) (Canada only > 11Y, 11D <) (Japan only > 11Y, 11K <): Provides EIA RS-232-C (CCITT V.24/V.28) interface.

**Model 12** (Except Canada and Japan > 12Y <) (Canada only > 12Y, 12D <) (Japan only > 12Y, 12K <): Provides program-selectable interface of either EIA RS-232-C (CCITT V.24/V.28) or EIA RS-422-A (CCITT V.11).

Note: Mdl's 11Y/12Y provide English (US).

(Canada only > Note: Mdl's 11D/12D provide Canadian-French. <)

(Japan only > Note: Mdl's 11K/12K provide Katakana. <)

(Canada and Japan only > A keyboard and a cartridge unique to language are provided to each of all models <) (Canada and Japan only > 11Y/ <) (Canada and Japan only > 12Y. <)

Upon request from the customer, the 3164 is available with a 90-day warranty. Orders are entered in AAS with special model numbers. These special model numbers are for ordering and administrative purposes only. The special model numbers correspond to the standard 3-year warrantied models as follows:

3-Year Warranty Model	Corresponding 90-day Warranty Model
3163-11X	3163-16X
3163-12X	3163-17X
3163-86X	3163-Z6X

**Customer Setup (CSU):** The 3164 is designated as a customer setup machine. Setup instructions are shipped with each machine, as the "IBM 3164 ASCII Display Station Setup Instructions" (GA18-2319).

### HIGHLIGHTS

The 3164 displays up to 1,920 characters, 24 rows of 80 characters each. An alphanumeric character is represented in an 8x16 contiguous box matrix. The data displayed uses the 128 characters of ASCII/ISO codes and an additional character set containing 24 line drawing graphics, 10 superscript characters and 10 subscript characters. A line drawing character is represented in a maximum 8x16 dot matrix to create a contiguous line. The character transmission mode provides the capability to transmit a character over a communication line upon depression of each key. The block transmission mode, selectable at setup time, allows buffered transmission mode of data. The 3164 consists of the three machine elements (Video, Logic, and Keyboard) and cartridge.

**Color Capability:** The color presentation in the 3164 (native) mode provides up to 8 color attributes in both the foreground and the background of the characters. In the default color mode if pre-determined, the 3164 displays characters in up to 4 default colors de-

pending on the combination of field attribute and character attribute.

**Communications Flexibility:** The use of ASCII (ISO) codes and the asynchronous communication interface allows the 3164 to attach to a variety of host processors. Various communication options are selectable by the customer on the setup menu such as line speed (50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600 and 19,200 bps), parity (none, odd, even, mark, space), interface (EIA RS-232-C (CCITT V.24/V.28), EIA RS-422-A (CCITT V.11)), word length (7, 8-bit), operation mode (echo, character, block mode), turn-around character (ETX, EOT, CR, DC3), line control (CRTS, PRTS, IPRTS), stop bit (1, 2), response delay (0, 100ms) and break signal (170, 500ms).

**Operator Factors:** The 3164 has an etched screen, which minimizes glare and fingerprints. Indicators are displayed under the divider scan on the bottom (25th row) of the screen, and provide useful operator information. An audible alarm is provided to alert the operator, and its volume is adjustable by the operator. The video element can be tilted and swiveled by the pedestal to set the screen angle for the operator. The cable-connected keyboard can be moved and its slope is selectable.

**Input Editing Capability:** Cursor move (up, down, right, left, and home), tab (forward, backward, set and clear), erase (end of line, end of page and entire page), clear (entire page and entire buffer), insert (character and line) and delete (character and line) are provided. Tab erase, insert and delete may be manipulated by field attribute. All characters can be rendered by character or field attributes. A 12-key numeric keypad and 12 Function (F) keys are provided on the keyboard.

Major characteristics of the 3164 are:

- Windowing (up/down/ left/right)
- Split screen capability (viewports, paging, partitioning)
- Vertical smooth scroll
- Auto skip
- Divider scan
- CRT saver with programmable timer
- Hold screen (stop scrolling temporarily)
- Block or underlined cursor with blinking option
- Block LRC (Longitudinal Redundancy Checking)
- Host access to the indicator row
- Character attributes for blink, non-display, underline, reverse, high intensity
- Field attributes for normal, blink, non-display, underline, reverse, high intensity, protected, numeric, right justify with zero or space, must fill, must enter and auto send
- Color attributes for red, green, blue, yellow, magenta, turquoise, black and white
- Line attributes for double high/double wide characters
- Re-definable keyboard layout and customer replaceable keytops
- 12 Function (F) keys redefinable from the terminal, as well as from the host (12 keys with two shifts each)
- 7680-characters buffer
- Host-loadable characters or patterns of up to 94
- Bidirectional auxiliary port

**Emulation Modes:** A machine mode to emulate 3101 mdl (Canada only > 881 or <) 23 is provided. The 3163 compatible mode is provided as the default color mode.

**Cables:** The customer is responsible to prepare cables. Many IBM systems provide their own unique cables for 3164 attachment and those systems should be referenced for detail information. A modem cable is provided as an IBM accessory for use in attaching to certain devices (specifically modems) and an I/O cable are provided as an IBM accessory for attaching the 4201 Proprietary.

**Auxiliary Port:** An auxiliary interface is provided for attachment of an input or output device with EIA RS-232-C (CCITT V.24/V.28). The

4201 Proprinter may be attached using the I/O cable provided as an accessory.

**Communications:** The 3164 communicates with a variety of host processors. When using the EIA RS-232-C (CCITT V.24/V.28) interface, the 3164 can communicate, through a modem, to a remote host processor at 50 - 1200 bps (and at 1800 bps in half-duplex mode), or it can directly (without a modem) attach to a host processor within 12.2m (40.0 ft) at 50 - 19,200 bps.

**Note:** For direct connect to the 8100 system, the 3.0m (10.0 ft) Modem Cable must be used; and the length of the 8100 direct connect cable cannot exceed 9.1m (30.0 ft), thus the total maximum cable length from the 8100 system to the 3164 must be 12.2m (40.0 ft).

When using the EIA RS-422-A (CCITT V.11) interface, the 3164 can communicate with a host processor, without a modem, up to 1,219m (4000 ft) at 50 - 19,200 bps depending on the type of cable used. A shielded communication cable is recommended. Multi-function attachment cable is used to attach a 3164 mdl 12 to the host via IBM Cabling System.

**Communicating through Modem:** When using an extended modem through EIA RS-232-C (CCITT V.24/V.28) interface, the 3164 operates in point-to-point On full-duplex facility at transmission speeds of up to 300, 600 and 1200/600 bps on nonswitched facilities. D1, D3, M1, M2, M1M, M2M, P1 and P2. In addition, the 3164 operates on switched facilities at transmission speeds of 50, 75, 110, 134.5, 150, 200, 300, 600 and 1200/600 bps in full-duplex and half-duplex modes, and at 1800 bps in half-duplex mode and at 2400 bps in full-duplex mode. For attachment to the facility P1 or P2, character mode or echo mode will be used. For communication capabilities, product utilization and special features, see M2700 pages. The 3164 provides XON/XOFF Control. The 3164 may be attached to packet switched networks through the PAD complying with the CCITT recommendation X.28 via DCEs with CCITT X.20 bis interface.

**Modems:** A modem cable is required for the attachment to a modem. 5841 and PTT mandatory modems complying with CCITT Recommendations (1979), V.24, V.28, ISO standard 2110 and either CCITT Recommendations V.21, V.22 or V.23 may be attached. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

**Software Support:** The 3164 is supported both in 3163 Compatible Mode and in 3101 Mode by Series/1, 3708, 3710, 7171 and other hosts that support the CPT-TWX 33/35 ASCII protocols. The 3164 is also supported in 3101 mode by System/88, 8100, and the other IBM hosts that support the 3101 Mdl (Canada only >881 or <) 23. The 3164 support is provided by the current version of the following licensed programs:

System -	Licensed Program	3164 Native Mode	3101 Mode
Series/1	RPS, EDX, CM, CF	-	X
	TPS	X	X
	IOX*	X	X
System/88:	OS, 3270 Emula. TP, HLL	-	X
8100:	DPCX, DPPX	-	X
S/370, 30XX, and 4300:	DOS/VSE, OS/VSI, MVS/370, MVS/XA, VM/SP and VM/SP HPO via:		
	*3708, 3710, 7171	X	X
	*270X, 370X, 3725/6, 4995, 7426, and 8100	-	X
* Series/1 5170 System Unit only.			

In non-emulation mode, the 3164 generates an ANSI X3.4 data stream (mdls 11Y and 12Y only).

**System Attachment:** Series/1 and Non-IBM Mini Computers attach the 3164 with RS-422-A (CCITT V.11) interface (mdl 12 only), or RS-232-C (CCITT V.24/V.28) interface both in 50 to 19.2K bps line speed, and via a modem with RS-232-C (CCITT V.24/V.28) interface in 50 to 1200 bps line speed. IBM Processors attach the 3164, via 270X, 370X, or 3725/6 with RS-232-C (CCITT V.24/V.28) interface in 50 to 1200 bps line speed, via 370X-8100 or 3725/6-8100 with RS-232-C (CCITT V.24/V.28) interface in 50 to 1200 bps (with modem) or 50 to 9600 bps (without modem) line speed, and via a protocol converter with RS-232-C (CCITT V.24/V.28) interface in 50 to 19.2K bps line speed. For connection of the 3164 to 8100, a connection cable of 9.1m (30 ft) or less and a modem cable of 3m (10 ft) must be used. As an alternative to a modem attachment, the 3164 may be directly connected to a ROLM CBX at speeds up to 9600 bps through one of the following devices with RS-232-C (CCITT V.24/V.28) interface: Rolmphone Datacom Module (DCK), Data Terminal Interface (DTI), rack-mounted version of the DCM or DTI.

**Keyboard:** The 3164 keyboard, compatible with the 3163 keyboards, detachable from the Logic WSE, has coiled cable, low profile with tactile feedback, and 102 (Canada only > or 103 <) (Japan only > or 104 <) keys including 12 Function keys shiftable to 24, 3 Program Attention keys, and a numeric keypad with a line drawing capability. There are 41 keys that are re-definable by swapping the function of two keys, copying from one key to another, deleting a function from the keyboard and setting a default function. Keycaps are also changeable.

**Printers:** The 3164 has an auxiliary port that can connect an ASCII printer over an RS-232-C direct connection. A print key allows local printing of the screen, while the software commands allow remote printing from a host. For example, the 4201 Proprinter may attach via its serial interface to the 3164 for direct printing of text-oriented screens (or graphics and text via host programming).

**IBM 3101 Compatibility and Migration:** The 3164, when operating in 3101 emulation mode, will accept and generate the 3101 mdl 881 data streams. There are two methods of placing the 3164 into the 3101 emulation mode. The operator may select the 3101 mode during menu setup, or a suitably programmed host may send a "3101 mode" command to 3164. There are some operational differences in terms of the screen management facilities. The 3164 ASCII Color Display Station Description documents these differences.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3164 to enhance the availability to the customer. This has been done through the use of Problem Analysis and Solving routines and procedures that are used by the customer. See "Customer Responsibilities" below.

**Customer Responsibilities:** The customer is responsible for:

1. Preparation of adequate site, system, cables and other vendor.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup, connection of cables in customer access area, setting of setup and select options.
4. Determination of the required number of spares.
5. Performing Problem Analysis and Resolution using "IBM 3164 ASCII Display Station Operator Reference and Problem Solving Guide".
6. (Except Japan > Returning a failing workstation element to an IBM Repair Center (for Customer Carry-In Repair maintenance) with a completed Service Replacement Order Form for repairs, if required. <)
7. Ordering the "IBM 3164 ASCII Display Station Description" for site planning and preparation work, if required additionally before it is shipped with each machine.

8. Evaluation of the attachment capabilities of the 3164 to the Host Processor at the other end via the modem or Packet/Depacket (PAD) function of the telecommunication network.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3164 units for such use. The number of spare units is dependent upon the number of 3164 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility. However, the minimum number of spare units recommended where one unit consists of a keyboard, a logic, and a video is shown in the following table:

Recommended Minimum Number of Spare 3164s:

Number Installed	Recommended Minimum Spare Machines
1 - 50	1
51 - 100	2
101 - 300	3
301 - 500	5
501 - 700	6
701 - 1000	7

The customer should be advised to verify units for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as an individual workstation element where spare elements do not have VPA discount. See "Accessories" for ordering individual elements.

**Customer Responsibility for Damaged or Altered Elements:** (Except Japan> Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged at IBM's then current hourly service rates and minima. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the Service/Exchange Communication Center (S/ECC). IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer. All on-site assistance is available on an hourly service basis at the applicable hourly rates and terms.

Customer-owned spare elements may be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. On-site assistance is available on an hourly service basis at the applicable hourly rates and terms.<)

## Publications

- (Except Canada and Japan> "IBM 3164 ASCII Color Display Station Description" (GA18-2317).
- "IBM 3164 ASCII Color Display Station Operator Reference and Problem Solving Guide" (GA18-2318)
- "IBM 3164 ASCII Color Display Station Setup Instructions" (GA18-2319) <)
- (Canada only> "IBM 3164 ASCII Color Display Station Description" (GA18-2317) (mdls 11Y/D, 12Y/D)
- "IBM 3164 ASCII Color Display Station Operator Reference and Problem Solving Guide" (GA18-2318) (mdls 11Y, 12Y), (GA09-0283) (mdls 11D, 12D)
- "IBM 3164 ASCII Color Display Station Setup Instructions" (GA18-2319) (mdls 11Y, 12Y), (GA09-0285) (mdls 11D, 12D) <)
- (Japan only> "IBM 3164 ASCII Color Display Station Description" (GA18-2317) (mdls 11Y/K, 12Y/K)
- "IBM 3264 ASCII Color Display Station Operator Reference and Problem Solving Guide" (GA18-2318) (mdls 11Y/12Y), (GA18-2434) (mdls 11K, 12K)
- "IBM 3164 ASCII Color Display Station Setup Instructions" (GA18-2319), (mdls 11Y, 12Y), (GA18-2435) (mdls 11K, 12K) <)
- "IBM 3164 ASCII Color Display Station Repair Center Maintenance Information" (SY18-2118)

- Keyboard Overlay (GA18-2143)

For others, see "KWIC Index" (G320-1621) or specific system bibliography.

## SPECIFY

No Need to specify for the following standard features.

- Power: 100-125V AC, 1-phase, 3-wire, 50/60 Hz. 200-240V AC, 1-phase, 3-wire, 50/60 Hz.
- Power Cord: 2.8m (9 ft) cord is provided for all models.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The following accessories may be ordered:

By using a P/N, order from the Country Direct Marketing Center, or other Supplies Marketing Groups.

Description	P/N
Blank keycaps - light (60 caps) and a keycap removal tool	1351710
Blank keycaps - dark (60 caps) and a keycap removal tool	1351728
Clear lens cap - with paper inserts (60 light and 60 dark) and a keycap removal tool	6341707
Keycap removal tool (6 tools)	1351717
Paper Inserts for clear lens keycaps (150 light and 150 dark) and keycap removal tool	6341704
(Except Japan> Modem Cable - inch screws	6343332<)
Wrap Socket	5640724
Tag	5640852
(Except Japan> I/O Cable	6343373
Multi-function attachment cable	8310553<)
(Japan only> Modem Cable - metric screws	6343333
Wrap Socket	5640724
I/O Cable	6343373
Multi-function attachment cable	8310553<)

For connection to 5841 modem or PTT modem the above IBM cable or equivalent must be used.

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by the IBM maintenance agreement and must be purchased by the customer when a replacement is needed.

Order through Branch Office Parts Station and/or Field Part Distribution Centers to NSD Greencastle or the customer directly places orders to the IBM Parts Order Center in Greencastle.

Description	P/N
-------------	-----

Field Packing Material:

Video	6317356
Logic	6165946
Keyboard	7342889

(Except Canada and Japan)	
11Y,12Y Video-	Taiwan, 6405303
	Colombia,
	Costa Rica,
	Dominican Rep.,
	El Salvador,
	Guatemala, Honduras,
	Mexico, Panama
-	Philippines 6405305
	Bolivia, Ecuador
-	Australia, 6405306
-	Hong Kong, 6405307
	Malaysia,
	Singapore,
	Indonesia,
	Chile, Paraguay,
	Uruguay

## MACHINE ELEMENTS

Elements can be ordered to provide individual elements as needed by the customer for the use of the 3164.

**Order Entry:** For shipment, specify Machine Element Number (P/N) at the time of order entry. Order by Parts Requisition.

The 3164 elements can be ordered as follows:

To Fit Model	Machine Element	P/N
(Canada only>		
11Y/D,		
12Y/D	Video	6405302
11Y/D,		
12Y/D	Video Cable	6405213
11Y/D	Logic	6113004
12Y/D	Logic	6113005
11Y,12Y	Keyboard-English US	1386304
11D,12D	Keyboard -	
	Canadian French	1388704
11D,12D	Cartridge -	
	Canadian French	6343351
11Y/D,		
12Y/D	Pedestal	6165550
11Y/D,		
12Y/D	Power Cord 2.8m (9 ft)	6952297
<)		
(Japan only>		
11Y/K,		
12Y/K	Video	6405303
11Y/K,		
12Y/K	Video Cable	6405213
11Y/K	Logic	6113004
12Y/K	Logic	6113005
11Y,12Y	Keyboard - English US	1386304
11K,12K	Keyboard - Katakana	1388703
11K,12K	Cartridge - Katakana	6343320
11Y/K,		
12Y/K	Pedestal	6165550
11Y/K,		
12Y/K	Power Cord 2.8m (9 ft)	6952297
<)		

11Y,12Y	Video Cable	6405213
11Y	Logic	6113004
12Y	Logic	6113005
11Y,12Y	Keyboard - English US	1386304
11Y,12Y	Pedestal	6165550
11Y,12Y	Power Cord 2.8m (9 ft)	
-	Taiwan, Philippines,	6952297
	Colombia, Costa Rica,	
	Dominican Rep., Ecuador,	
	El Salvador, Guatemala,	
	Honduras, Mexico, Panama,	
	Bolivia	
-	Indonesia	6952317
-	Hong Kong, Malaysia,	6952353
	Singapore	
-	Australia,	6952308
	New Zealand	
-	Argentina, Uruguay,	6952285
	Paraguay	
-	Chile	6952371
-	Venezuela	6952397

<)

**Maintenance:** Maintenance for individual workstation element is available at IBM Repair Centers or through an IBM Service/Exchange Center at the applicable IBM Hourly Service rates and minimum charges.

## SUPPLIES (NONE)

## 3174 SUBSYSTEM CONTROL UNIT MODELS 1L, 1R, 2R, 3R

### THIS PRODUCT HAS MORE THAN ONE MODEL DESCRIPTION

#### PURPOSE

Large-cluster control units for local, remote, or local area network attachment of up to 32 3270 Information Display System displays, printers, and workstations to IBM host processors via S/370-architecture channels, telecommunications links, or IBM Token-Ring Networks. An optional feature provides for attachment to ASCII terminals and hosts via telecommunications links.

#### MODELS 1L, 1R, 2R, 3R

**Model 1L:** S/370-architecture channel interface for SNA and non-SNA local attachment.

**Model 1R:** EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment.

**Model 2R:** CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment.

**Model 3R:** IBM Cabling System interface (IEEE 802.5/ECMA 89) for IBM Token-Ring Network attachment.

#### Prerequisites:

1. The Model 1L requires a control unit position on a system channel. See processor pages for details.
2. When a Model 1L is attached to a 308X channel via a 3044 Fiber Optic Channel Extender Link, the 3044 Model D01 must have RPQ 8P1162.
3. When a Model 1L is attached to a 4361 byte multiplexer channel, the 4361 must be at EC level 364436, or higher.
4. When a Model 1L is attached to a 3090 channel, the 3090 must be at System EC level 218590 with patches CXL10044 and CXY10045 applied.
5. A control unit terminal (CUT) or 3270-PC operating in CUT mode attached to port 0 is required to customize subsystem microcode or to run offline diagnostics from a display.
6. A CUT or 3270-PC operating in CUT mode attached to any port is required to perform subsystem RAS tests.
7. A CUT or 3270-PC operating in CUT mode attached to any port is required to establish X.21 switched network and X.25 sessions. After session establishment, all terminals, CUT and DFT, can use the established session.
8. 3299 Terminal Multiplexers and/or 3174 Terminal Multiplex Adapter optional features are required to attach more than four terminals to these models.
9. The Model 3R requires 3174 Configuration Support-A, Release 2 (or higher) microcode, which is shipped with each machine.

**Customer Setup (CSU):** All models, model conversions, and features ordered via MES after the machine is shipped from IBM are designated as Customer Setup.

#### HIGHLIGHTS

The 3174 is a non-programmable subsystem control unit to attach 3270 Information Display System displays, printers, and workstations to IBM host processors. An optional feature provides for attachment to ASCII terminals and hosts. The 3174 runs under control of its integrated microprocessor and associated control program, which can be customized by the user to meet specific requirements.

Units are shipped with a host-attachment adapter, 1.0Mb of control storage, a 1.2Mb diskette drive, a utility/diagnostic diskette, and a 4-port terminal adapter to attach up to 32 supported devices (see "Terminal Attachment") via 3299 Terminal Multiplexers or via op-

tional Terminal Multiplexer Adapter features. The Model 1R provides both EIA RS-232 (CCITT V.24) and CCITT V.35 interfaces. The desired interface is enabled during IML of the control unit, based on the type of communication cable (RS-232 or V.35) that is attached. All units are shipped with a 4.3m (14 ft) power cord.

Characteristics of the 3174 Models 1L, 1R, 2R, and 3R include:

- Function base equivalent to 3274 Models 41A, 41C, and 41D with Configuration Support D microcode, except:
  - 3278 Model 1 displays (960-character buffer) and use of the 960-character buffer format by printers are not supported.
  - (Canada only > 3278/3279 PC Attachment features (#5315, #5316/#5325, #5326) are not supported. <)
- New features and functions:
  - Model for attachment to the IBM Token-Ring Network.
  - Multiple Logical Terminals support for interaction with up to five host sessions in base microcode. Four levels of MLT support are selectable at customization: MLT Level 0 allows no MLT; MLT Levels 1, 2, and 3 reserve specific amounts of storage which allow various combinations of displays and session counts to be defined. (Refer to Customization documentation.) See the Configuration Support-A Multiple Sessions and Storage Considerations under Special Features for storage requirements for MLT and other features/functions.
  - Support for up to 180 SNA LUs.
  - Teleprocessing Communication Adapter Features that allow the 3174 Models 1L and 3R to operate alternatively as a 3174 Model 1R or as a Model 2R.
  - Response Time Monitor in 3174 base hardware.
  - IBM Token Ring Network 3270 Gateway feature for the Models 1L, 1R, or 2R to provide data passage between an IBM SNA host and terminals attached to an IBM Token-Ring Network downstream of the 3174.
  - Asynchronous Emulation Adapter feature that provides 3270 terminal emulation for communication between ASCII terminals and IBM hosts, and ASCII terminal emulation for communication between IBM control unit terminals (CUTs) or IBM PCs operating in CUT mode and ASCII hosts.
  - Connectivity to OEM devices and subsystems via the Serial OEM Interface (SOEMI) through the Model 1L operating in non-SNA mode. This function is supported in 3174 Configuration Support-A, Release 2 or higher microcode.
  - Single-tag Interlocked and two-tag High-Speed-Transfer channel operational modes for the Model 1L, for channel data rates up to 1.25Mb per second.
  - Channel cabling up to 122m (400 ft) for the Model 1L, as specified in S/370 channel architecture.
  - Channel attachment for the Model 1L via IBM Reduced Diameter Channel Cable.
  - 3178 Model C30 and C40 keyboard support in base microcode.
  - X.21 Short Hold Mode support in base microcode.
  - ASCII-8 and ASCII-International character set support in base microcode.
  - (APG only > Support for Thai language in base microcode of Configuration Support-A. <)
  - Support for the IBM Enhanced Keyboard, available on recent IBM displays, in base microcode.
  - X.25 support without the need for additional storage.
  - Mix and match IBM 3299 attachment with direct terminal attachment.
  - Cabling to devices via direct attachment to IBM Cabling System media. A balun cable assembly is not required.
  - A basic 5.25-inch, high-capacity diskette drive, and capacity for another as an optional feature.
  - Accommodation for up to 10 microcode RPQs per control unit.
- CMOS technology and VLSI circuitry for better RAS characteristics, lower power consumption, and a smaller footprint than 3274 Control Units.

- Increased internal performance compared to the 3274, resulting in less sub-system delay for most transactions.
- TP link speeds up to 64K bps.
- 1.0Mb of control storage to accommodate the control program and microcode-selectable functions. Control storage features in increments of 512Kb and 1.0Mb are provided for features and functions, require that more than the 1.0Mb base storage.
- 20Mb Fixed Disk Drive optional feature.
- Improved RAS characteristics:
  - Reliability and availability of the 3174 are enhanced by the following elements:
    - ▲ Built-in microcode and hardware error recovery.
    - ▲ Self-identifying adapters by type number and location at both IML and control unit diagnostic operation.
    - ▲ Uninterrupted IML for non-critical conditions. Complements host-initiated IML under Central Site Change Management.
    - ▲ Continued control unit operation by unaffected portions during faults in the Terminal Adapter, Asynchronous Emulation Adapter, and IBM Token-Ring Network 3270 Gateway Adapter (with Configuration Support-S, Release 2.1)
    - ▲ Hardware error correction code for storage.
    - ▲ Dynamic storage reconfiguration.
    - ▲ Automatic retry of channel command (Model 1L).
    - ▲ Fewer field-replaceable units.
  - Serviceability of the 3174 is enhanced by the following elements:
    - ▲ Self-configuring offline diagnostics, with automatic or manual selection.
    - ▲ FRU call out at operator's panel and/or display terminal.
    - ▲ Error status codes reported on four, 7-segment light emitting diodes (LED).
    - ▲ Errors time-stamped and logged to the diskette.
    - ▲ Expanded Alerts, including type and location of failing components, specifics of Bind failures, and specifics of failing data streams.
    - ▲ Device attachment media threshold Alerts without the need for a timer special feature.
    - ▲ Logging of executing task and microprocessor priority level upon control unit failures.
    - ▲ Terminal interface driver/receiver wrap capability.
- Improved Customization. Customization of subsystem control units is enhanced through the following elements:
  - A central site customization facility (see "Central Site Customizing", below, under "Offline Utility Procedures".)
  - Electronic distribution of customization parameters and/or data via the Central Site Change Management function.
  - Use of words and phrases on the customization panels, as opposed to only numbers and symbols.
  - Error messages presented on screen.
  - Optional selection of Printer Authorization Matrix definition panel, with self-explanatory prompts.
  - Reduced number of questions for equivalent function.
  - Reduced diskette swapping.
  - Expanded use of defaults.
  - Reduced machine execution time.
  - Use of full screen with a CUT-mode terminal Model 3 or 4, rather than presentation in a Model 2 format.
- Offline Utility Procedures. 3174-based offline utility procedures to aid in configuring and managing of 3174 microcode and to provide offline diagnostic functions are provided on a Utility/Diagnostic diskette. The procedures are invoked from a 'Master Menu' panel that is displayed on a Control Unit Terminal (CUT) attached to port 0. 3174 offline utility procedures include:
  - Customize the Control Diskette. Provides facilities to configure control unit microcode, define printer authorization matrix, merge RPOs, and modify keyboards.
  - Merge Downstream Load. Provides the ability to merge the microcode provided on individual auxiliary microcode diskettes for the Asynchronous Emulation Adapter feature (#3020) and downstream-load terminals, such as the 3192 "G" Models, on to one downstream load diskette. Use of this procedure requires the 1.2Mb Diskette Drive optional feature (#1046) or 20Mb Fixed Disk Drive optional feature (#1056).
- Copy Files. Through its seven variations, provides a means of duplicating diskettes, copying specific data areas, and copying with configuration modifications from one control diskette to another. The functions of the 3274 "Diskette Processing Aid" RPO 8K1071 are included in this procedure. The 'Full Copy' and 'Modify and Copy' facilities require the 1.2Mb Diskette Drive optional feature (#1046) or the 20Mb Fixed Disk Drive optional feature (#1056). The feature is not required for the other Copy Files options, but their usage is enhanced with it, since the need for diskette swapping is reduced.
- Diagnostics. Provides a full range of offline diagnostics. They are selected from a menu panel when this procedure is invoked.
- Microcode Upgrade. Provides a process to update a newly released control diskette with the configuration data from a down level control diskette, thus reducing the time required to execute this task.
- Encrypt/Decrypt. Provides facilities to load a master key value into the Encrypt/Decrypt adapter, display the Verify Pattern that is resident on the Encrypt/Decrypt diskette, verify the current master key value, and test the Encrypt/Decrypt feature. It is applicable only to Models 1R, 2R, and 3R that have the Encrypt/Decrypt optional feature (#3680).
- Identify Customizing Keyboard. Expands the types and configurations of keyboards from which the 3174 customization process can be executed.
- Central Site Customization. Enhances the management, distribution, and control of microcode for 3174 control units in a network. It provides the ability to create offline, a Central Site Library (CSL) of network control unit data; create, modify, browse, or delete library members; and generate customized control diskettes for mailing to network 3174s. The 1.2Mb Diskette Drive optional feature (#1046) or 20Mb Fixed Disk Drive optional feature (#1056) is required to use this procedure. Although not required, additional storage is recommended to facilitate generating diskettes for network control units by reducing the time and manual intervention required to read individual, duplicate control diskettes. (See "Configuration Support-A Multiple Sessions and Storage Considerations" for details.) This procedure is a prerequisite for Central Site Change Management. It does not support microcode management, distribution, or control for a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway optional feature (#3025) Release 2.0 or lower.
- Central Site Change Management. Provides electronic distribution of customization parameters and/or data to network 3174s. The Central Site Customizing Utility function in Configuration Support-A, Release 3 is required on a 3174 Model 1L, 1R, 2R, or 3R that is designated as the central site control unit. The customization parameters and/or data for control units in the network are electronically distributed via the required version/release of Distributed Systems Executive (DSX) 1 in the IBM central site host using the LU 6.2 support provided in the ACF/VTAM Version 3, Release 2. Electronic distribution of customization parameters is to any model of the 3174 in a non-disruptive mode. Electronic distribution of other data may require network site intervention depending on that network 3174s model and/or hardware features installed. The 20Mb Fixed Disk Drive feature is not a prerequisite but is desirable for some 3174s participating in Central Site Change Management. Additional storage may be required when combined with other functions (see "Configuration Support-A Multiple Sessions and Storage Chart"). In addition to providing the electronic distribution support for central site control units, CSCM also provides the complementary support to receive customization parameters and/or data at the network control units. Central Site Change Management is not available in 3174s with the IBM Token-Ring Network Gateway feature (#3025) installed.
- Improved Usability:
  - Operator's panel with 10-key numeric pad and four 7-segment light emitting diode (LED) readouts.

- User-friendly problem determination tools, including self-configuring diagnostics, extensive use of program function keys, and formatted displays of configuration data.
- Multi-purpose channel-attachment adapter that accommodates either SNA or non-SNA host attachment protocol.
- Multi-purpose teleprocessing adapters that provide variable operating speeds, host attachment interfaces, and protocol support.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, and other vendor preparation.
2. Price quotations, installation, and costs (initial and recurring) of common carrier equipment and service.
3. Procuring bus/tag (and optional power control) cables for Model 1L.
4. Receipt at the customer's receiving dock, unpacking, and placement of the unit.
5. Procuring and attaching appropriate cables for connections between the Asynchronous Emulation Adapter and terminals/modems.
6. Physical setup, connection of cables to communication lines/modems and IBM CSU devices, setting switches, and check out.
7. Contacting CE to accomplish the channel connection tasks for the Model 1L.
8. Performing customization in accordance with IBM-supplied procedures:
  - For initial setup.
  - When made necessary by changes in configuration.
  - For updating control unit diskettes (at customer option).
  - When initializing and updating the keyboard tables using the Keyboard Definition facility of the customization procedure.
9. Contacting Customer Engineering to make 3174 cable connections to non-CSU IBM units.
10. Setup of model conversions and features ordered after the unit is shipped from IBM.
11. Using the problem determination procedures provided with the unit prior to calling IBM for service.
12. Following instructions provided by IBM regarding relocation.

**Publications:** See "KWIC Index", G320-1621, or applicable system bibliography.

- 3270 - GA23-0058
- 4300 - GC20-0001
- 8100 - GC20-8100

**HONE:** Use the HONE configurator (CF3270) to assist in configuring the 3174 before entering an order.

## TERMINAL ATTACHMENT

All 3174 models use the same terminal attachment interface architectures; they are the same as used by the 3274. Documentation describing the interface between 3X74 control units and their attached terminals is available.

The displays, printers, 3270-PCs, and IBM PCs (and associated emulation software) supported for attachment to the 3174 are listed below. Products and software not specifically listed should be tested by the customer to verify correct operation. Continued improvements in the 3174 and attaching terminals may require micro-code or hardware updates to the attaching products. Refer to RETAIN for information on product compatibility.

Terminals can attach to 3174 Models 1L, 1R, 2R, or 3R via 3299 Terminal Multiplexers, or via 5209 3270-5250 Link Protocol Converters, or via optional Terminal Multiplexer Adapter feature (#3103).

Either RG-62A/U coaxial cable, IBM Cabling System media (Canada, Australia, Japan only) or specified telephone twisted-pair wire (IBM Cabling System Type 3 media) can be used for connections to the 3174. Depending on the type of wire used, the distance between the 3174 and its attached terminals can be up to 1,500m (4,920 ft); when a 3299 is used, the maximum distance can be up to 3,000m (9,840 ft). The 3174 ports are Dual Purpose Connectors (DPC), which do not require a balun cable assembly to connect terminals via IBM Cabling System Types 1, 2, or 9 media, but some terminals may. (Refer to the appropriate terminal pages.) Using a Balun assembly reduces the maximum allowable wire lengths as shown below.

## 3174 Terminal Attachment Maximum Wire Lengths:

Number of Baluns	RG-62A/U Coaxial Cable		IBM CABLING SYSTEM MEDIA			
			Types 1 & 2		Type 9	
	m	ft	m	ft	m	ft
0	1500	4920	1500	4920	1000	3280
1	N/A	N/A	1000	3280	667	2186

(Canada only) IBM Cabling System Type 3 Media (specified telephone twisted-pair wire) can also be used for connections to the 3174. Connection to the telephone twisted-pair can be via an IBM/ROLM Coax to Twisted-Pair Adapter (CTPA) or equivalent. When one end of the telephone twisted-pair is attached to a CTPA, the maximum wire length is 275m (900 ft). <)

## DISPLAY AND PRINTER ATTACHMENT

The following displays and printers are supported for attachment to the 3174. (See Note 1.) The Type-Models (prerequisites) Names are:

- \*3178-C10, C20, C30, C40 Display Station
- \*3179-1 Color Display Station
- \*3179-G1, G2 Color Display Station
- \*3180-1 Display Station
- \*3191-A1X, B1X, D1X, E1X, L1X, A2X, A3X, B2X, B3X, D2X, D3X, E2X, E3X, L2X, L3X Display Station
- \*3192-C1X, F1X, C2X, C3X, F2X, F3X Color Display Station
- \*3192-D1X, L1X, D2X, D3X, L2X, L3X Display Station
- 3192-G10, G20, G30, G40 Color Graphics Display Station
- 3193-1, 2 (Note 2) Display Station
- \*3194-C10, C20, D10, D20, H10, H20, H50 Display Terminal
- 3262-3, 13 Line Printer
- 3268-2 Printer
- 3268-2C Color Printer
- \*3278-2, 3, 4, 5 Display Station
- \*3279-S2A, S2B, S3G, 2X, 3X Color Display Station
- 3287-1, 2 (#8331) Printer
- 3287-1C, 2C Printer
- 3290-220, 230, T30 Information Panel
- 3812-2 (#3190) Pageprinter
- 3814-A1, A2, A3, A4 (#1440) Switching Management System
- 4224-201, 202, 2E2, 2C2 Printer
- 4234-1 Dot Band Printer
- 4245-D12, D20 (Note 2) Line Printer
- 4250-1 (Notes 2, 3) Printer
- 4250-2 (Notes 2, 3) 4250 II ElectroCompositor
- 5210-G1, G2 Printer
- (APG only) 5227-11 Printer
- 5578 (Note 5) Japanese Workstation <)
- OEM Devices & Subsystems (Note 4) Serial OEM Interface (SOEMI)

\* Control unit terminal (CUT) or terminal that can operate in CUT mode and be used for customization, running 3174 offline

diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions.

Notes:

- 3278 Model 1 displays (960-character buffer) and the "960-Character Print Operation" option that is available on some printers are not supported.
- The high data volumes possible with this device may not be realized when attached to Models 1R and 2R via TP links. It is strongly recommended that the "Performance Guidelines for IBM 3X74 Attached Workstations", ZZ20-4167, be consulted to determine what performance may be expected.
- Attachment to Models 1R, 2R, or 3R requires 4250 RPQ 7B0980. Supported only on Model 1L and only when operating with non-SNA protocol. The high data volumes possible through this attachment may affect subsystem performance. It is strongly recommended that the "Performance Guidelines for IBM 3X74 Attached Workstations", ZZ20-4167, can be consulted to determine what performance may be expected.
- (APG only) This terminal can operate in CUT mode and be used for customization. <

PERSONAL COMPUTER ATTACHMENT

**3270-Personal Computers:** The 3270-PCs supported for attachment to the 3174 are listed below. Current host communications programs that support a 3270-PC attached to a 3274 will work unchanged with a 3270-PC attached to a 3174. Any 3270-PC operating in CUT mode can be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions. The Type/Model(s) (Names) are:

5271 AII (3270-PC)  
5273 AII (3270-PC AT)  
5371 AII (3270-PC/G, GX)  
5373 AII (3270-PC AT/G, AT/GX)

**IBM Personal Computers:** The following IBM PCs are supported for attachment to the 3174 when emulating the functions of a 3278 Display Station Model 2 or a 3279 Color Display Station Model 2A or S2A through the software listed below. IBM PCs operating in CUT mode (APG only) except for the 5550 family < can be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions. The Type/Model(s) /Prerequisite/ (Names) are:

- 5150 AII /#5050/ (Personal Computer)
- 5160-068, 078, 086, 087, 088, 089, 267, 268, 277, 278 /#2507 or #5050/ (Personal Computer XT)
- 5170-068, 099, 239, 319, 339 /#2507 or #5050/ (Personal Computer AT)
- 5170-599, 739, 919, 939 (Personal Computer AT/370)
- (APG only) > 5540/5550/5560 System (Notes 1, 2) (5550 Family (as 3270)) <
- 6150-20, 25, A25 (RT Personal Computer)
- 6151-10 (RT Personal Computer)
- 8530-021 /#5050/ (Personal System/2 Model 30)
- 8550-021 /#2000/ (Personal System/2 Model 50)
- 8560-041, 071 /#2000/ (Personal System/2 Model 60)
- 8580-041, 071 /#2000/ (Personal System/2 Model 80)
- 9370 (Processor Console)

(APG only) Notes:

- Requires 3174 RPQ 8K1349, which is shipped with each machine in Japan, for 5550 printer sharing.
- Can operate in CUT mode and be used for customization. <

**PC 3278/79 Emulation and File Transfer Software:** The IBM PCs listed above are supported for attachment to the 3174 when configured to operate with:

- Personal Computer 3278/79 Emulation Control Program Version 2 (P/N 8665780)
- IBM PC 3270 Emulation Program, Entry Level (P/N 59X9904)
- IBM PC 3270 Emulation Program Version 3 (P/N 59X9969)
- 3270 Workstation Program Version 1.0 (P/N 74X9921) and Version 1.1 (P/N 75X1088)

- RT Personal Computer 3278/79 Emulation Program (PP 5669-052)
- IBM Virtual Machine/Personal Computer Release 2 (P/N 6467040)
- Personal Services/PC Release 1.04 (P/N 6403826) or higher
- VM Bond Release 2 (P/N 6467022)

**IBM PC Host File Transfer Software:** The 3174 supports the following host file transfer programs that allow the IBM PCs listed above to perform file transfers. Refer to the appropriate product documentation for details on the supported configurations.

- PC Bond (PP 5664-298)
- Virtual Machine/Personal Computer Release 2 (PP 5664-319)
- MVS/TSO (PP 5665-311)
- VM/SP (PP 5664-281)
- DISOSS - for MVS (PP 5665-290)
- DISOSS - for VSE (PP 5666-270)
- PROFS Version 2 (PP 5664-309) (Personal Computer Connection Extended)

SYSTEM ATTACHMENT

**Processors:** The 3174 communicates with the following IBM systems and processors using SNA and non-SNA protocols:

SYSTEM/PROCESSOR COMMUNICATION

SYSTEM PRO- CESSOR	Channel		REMOTE LINK			TOKEN- RING NETWORK (Mdl 3R)
	Mdl 1L		---Model---			
			1R	2R		
	SNA	NON SNA	SNA	BSC	SNA	SNA
S/1	-	-	X	X	X	-
S/36	-	-	X	-	X	-
S/38	-	-	X	-	X	-
S/88	-	-	X	X	X	-
308X	X	X	X	X	X	X
3090	X	X	X	X	X	X
4361	X	X	X	X	X	X
4381	X	X	X	X	X	X
8100	-	-	X	-	X	-
(DPPX Only)						
9370	X	X	X	X	X	X

Other system/processor attachments may be supported by RPQ, as appropriate. Use the HONE/INFO RPQ application to review for any additional supported systems. Use a search argument of "3174".

**Channel Attachment:** The 3174 Model 1L attaches to a byte multiplexer, block multiplexer, or selector channel of the processors listed above. The channel cable may be up to 122m (400 ft) long, under the conditions described in S/370 channel architecture. The Model 1L also attaches to the IBM 3044 Fiber Optic Channel Extender Link. Single-tag interlocked and two-tag High-Speed-Transfer channel operational modes are supported, for data rates up to 1.25Mb per second. When attached to 4361 high-speed channels via an IBM 3044 Fiber Optics Channel Extender Link, the Model 1L must be configured for Single-tag interlocked mode.

**Remote Link Attachment:** 3174 Models 1R and 2R can attach to a 308X, 3090, 4361/4381, or 9370 via a 3720 or 3725 Communications Controller. Attachment to S/1, S/36, S/38, S/88 and 8100 (DPPX only) is via communications features in those products. Refer to their "Machines" pages. Attachment to the 4361 and 937X may also be via its Communications Adapter or to the 9370 Telecommunication Subsystem Controller. A modem or other Data Circuit-Terminating Equipment (DCE) is required, unless the host processor or system

provides a method of direct-connection attachment, without the need for a DCE. The Model 1R can also attach via the 3710 Network Controller.

**IBM Token-Ring Network Attachment:** The 3174 Model 3R transmits and receives at four million bits per second using media access protocols conforming with IEEE 802.5 and ECMA 89 standards, and logical-link protocols conforming with IEEE 802.2 standard, over a baseband token-ring. It can attach to a 308X, 3090, 4361/4381 or 9370 via a 3720 or 3725 Communications Controller with the NCP/Token-Ring Interconnection (NTRI) facility of ACF/NCP Version 4 Release 2, or via a 3174 with the IBM Token-Ring Network 3270 Gateway optional feature (#3025).

**Communications Facilities:** 3174 Models 1R and 2R operate in data half-duplex point-to-point or multipoint modes on duplex or half-duplex nonswitched facilities, and in half-duplex point-to-point mode on switched facilities as listed below. Operation on switched network facilities is supported only through SNA/SDLC. See the M2700 pages for specific country networks that are supported.

## 3174 MODEL 1R:

ELECTRICAL INTERFACE	FACILITY (See M2700 Pages)	LINK/ NETWORK PROTOCOL	MAX. SPEED (bps)
EIA RS-232-C/ CCITT V.24/28 (External clocking required)	D,G	BSC	9.6K
	C,D,E,G	SNA/SDLC	19.2K
		SNA/SDLC (X.21bis)	19.2K
	K M		
	P	X.25 (X.21bis)	19.2K
CCITT V.35  (External clocking required)	D,G	BSC	9.6K
	D,E,G	SNA/SDLC	64K
	M	SNA/SDLC (X.21bis)	64K
	P	X.25 (X.21bis)	19.2K

## 3174 MODEL 2R:

CCITT X.21	L	SNA/SDLC	48K
	N	SNA/SDLC	64K
	Q	X.25	19.2K

**Modems:** IBM modems to which the 3174 Model 1R can attach include:

### Nonswitched Modems:

3833	2400 bps
3834	4800 bps
3863-1	2400 bps
3864-1	4800 bps
3865	9600 bps
3868-1	2400 bps
3868-2	4800 bps
3868-3	9600 bps
3868-4	9600 bps
5811	2.4/4.8/9.6/19.2K bps

	(Baseband)
5865	9600 bps
5866	14400 bps
5868	9600 bps
5868	14400 bps

Switched network backup (SNBU) mode of operation is possible using an appropriately featured external modem.

### Switched Network Backup Modems:

3863	2400 bps
3864	4800 bps
3865	9600 bps
5865	9600 bps
5866	14400 bps

### Switched Network Modems (SNA/SDLC only):

3863-2	2400 bps
3864-2	4800 bps

**PTT-Mandatory DCEs:** The 3174 Model 1R attaches to PTT-mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110, and relevant CCITT Recommendations for data transmission speeds. The Model 1R attaches to PTT-mandatory DCEs meeting CCITT Recommendation V.35 and ISO standard 2593.

**Non-IBM DCEs:** Non-IBM DCEs complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35, or X.21 may be attached to Models 1R and 2R under provisions of the IBM Multiple Supplier Systems Bulletin.

**Public Data Networks:** Models 1R and 2R attach to X.21 switched, X.21 nonswitched, and X.25 Public Data Networks as listed in Charts K, L, M, N, P, and Q of the M2700 pages. Keyboard labels are provided with every 3174 Model 1R and Model 2R to facilitate X.21 switched network and X.25 session setup and termination. Extra labels are available; see "SUPPLIES".

**3710 Network Controller:** The 3174 Model 1R can attach to the 3710 Network Controller as indicated in the chart below. The maximum total cable length permitted between the 3174 and the 3710 is 15m (50 ft).

### 3710 ATTACHMENT:

SPEED (K bps)	B S C	S D L C	3174 MODEL 1R INTERFACE
3710 FEATURE #7001:			
2.4/3.6/4.8/ 7.2/9.6	X	X	RS-232-C (V.24/28)
14.4/19.2	-	X	
3710 FEATURE #7005:			
2.4/3.6/4.8 7.2/9.6	X	X	CCITT V.35
14.4/19.2/ 48/56/64	-	X	

**Direct-Connection Attachment:** 3174 Models 1R and 2R can communicate with IBM hosts without the need for modems or other data circuit-terminating equipment. This method of 'direct-connection' attachment is made through the 3174 EIA RS-232-C (CCITT V.24/V.28), CCITT X.21, or CCITT V.35 interface, via appropriate connecting cables, to the direct-connection product's interface. The direct-connection product must provide bit clocking to the 3174.

Products that support direct-connection attachment of the 3174 are listed in the following table. Only the interface features needed by the direct-connection products are listed; they may have prerequisites, therefore the "Machines" pages for those products should be reviewed.

The maximum, total cable length allowed between the 3174 interface and the host product interface is 122m (400 ft), unless the host product imposes a shorter limit. The physical planning manuals for those products can provide cabling data and other information necessary for direct-connection attachment.

HOST PRO- DUCT	HOST PRODUCT FEATURE NUMBER	SPEED (K bps)	B S C	S D L C	3174 MODEL/ INTER- FACE
3720/ 3721	#4911 (LIC-1)	2.4/4.8/9.6 19.2	X	X	1R/ V.24
	#4931 (LIC-3)	2.4/4.8/9.6 19.2/38.4/56	X	X	1R/ V.35
	#4941 LIC-4A	2.4/4.8/9.6	-	X	2R/ X.21
	#4942 LIC-4B	2.4/4.8/9.6/ 19.2/38.4/56	-	X	2R/ X.21
3725/ 3726	#4911 (LIC-1)	2.4/4.8/9.6 19.2	X	X	1R/ V.24
	#4931 (LIC-3)	2.4/4.8/9.6 19.2/56	X	X	1R/ V.35
	#4941 LIC-4A	2.4/4.8/9.6	-	X	2R/ X.21
	#4942 LIC-4B	2.4/4.8/ 9.6/19.2/56	-	X	2R/ X.21
4361	#4801	2.4/4.8/9.6	X	X	1R/ V.24
8101, 8130, 8140- Mod- els A & b	#3701 (FACs 15-16)	2.4/4.8/9.6	-	X	1R/ V.24
	#1550 (FACs 24-26)	2.4/4.8/ 9.6/56	-	X	1R/ V.35
8140- Model C	#1621	4.8	-	X	1R/ V.24
	#1614	56	-	X	1R/ V.35
8150	#1733 or #1734	4.8/9.6	-	X	1R/ V.24
	#1742 or #1745	56	-	X	1R/ V.35
9370	#6031	2.4/4.8/9.6	X	X	1R/ V.24

## BASIC CONFIGURATION

The machine is shipped as follows if only mandatory specify codes are selected:

- Power (AC, 1-phase, 50/60 Hz):

Argentina	200-240V
Australia	200-240V
Brazil	100-127V
Canada	100-127V
	(Models 1R, 2R, 3R)
Canada	200-240V (Model 1L)
Chile	200-240V
Japan	100-127V
Mexico	100-127V
New Zealand	200-240V
Venezuela	100-127V
All Others	(Must specify desired power)

- (Except Canada, Mexico, Nicaragua, Japan > Power Cord Plug. Determined by the 3-digit DPMO WT country code. The plug most commonly used in the country is shipped. <)
- (Canada, Mexico, Nicaragua only > Power Cord Plug. A non-locking plug is shipped. <)
- (Japan only > Power Cord Plug. A locking plug is shipped. <)
- Nomenclature: The country code is used to select the language of the nomenclature provided on the operator and power control panels, based on the language most commonly used in that country. The following languages are available:
 

English	Portuguese
Japanese	Spanish
French	
- Communications Cable: (Model 1R) For the EIA RS-232-C/CCITT V.24 Electrical Interface.
- Two control diskettes containing 3174 Configuration Support A microcode and one utility/diagnostic diskette, which is required for 3174 subsystem on-site problem determination.

## SPECIFY

- Specify #2998 (mandatory specify).

The remainder of the "Specify" section can be ignored if the options described in the "Basic Configuration" section are satisfactory. These specify features are shipped in lieu of the corresponding item(s) listed above. Unless indicated otherwise, these specify features are available only at the time of manufacture.

- (Canada only > Voltage (AC, 1-phase, 60 Hz): (Model 1L) Specify #0802 for 120V power.
- Power Cord Plug. Specify one of the following:
  - Locking Plug: #9890
  - Waterproof Plug: (Model 1L) #9801. Limitations: Cannot be installed with 120V power (#0802). <)
- (Except Canada > Power (AC, 1-phase, 50/60 Hz). Specify one of the following:
  - 100-127V: #0802
  - 200-240V: #0801 <)
- (Canada, Nicaragua only > Power Cord Plug. Specify #9890 for locking plug. <)
- (Mexico only > Power Cord Plug. Specify #9890 for locking plug. Prerequisites: 200-240V Power (#0801). <)

- (Japan only > Power Cord Plug. Specify #9891 for non-locking plug. Limitations: Cannot be installed with 200-240V Power (#0801). <)
- Machine Nomenclature. Specify one of the following:
 

English #2924	Portuguese #2933
Japanese #2930	Spanish #2931
French #2928	
- CCITT V.35 Communications Cable: (Model 1R) Specify #9000 for CCITT V.35 Electrical Interface Cable. (This code causes a CCITT V.35 communication cable to be shipped instead of an EIA RS-232/CCITT V.24 cable.)
- Auxiliary Microcode Diskettes: Provides a diskette containing the operational microcode for each of the Distributed Function Terminals (DFTs) and 3174 features listed below. The diskette must be placed in the optional 1.2Mb Diskette Drive feature (#1046) or loaded on the optional 20Mb Fixed Disk Drive feature (#1056) and be available at all times to automatically provide the DFTs with downstream load services. A merge procedure is provided to combine multiple auxiliary microcode diskettes including that for the Asynchronous Emulation Adapter optional feature (#3020), onto one downstream load diskette. (Auxiliary microcode diskettes are available via MES.)
  - Asynchronous Emulation Adapter Microcode Diskette (#9015): For 3174 Subsystem Control Units that provide Central Site Library and Customization facilities and do not require the Asynchronous Emulation Adapter function or hardware.
  - 3179-G/3192-G Color Graphics Display Station Downstream Load Microcode Diskette (#9016).
  - 3193 Display Station Downstream Load Microcode Diskette (#9017).
  - 3290 Information Panel Downstream Load Microcode Diskette (#9021).
  - (Japan only > Specify #9025 for Katakana language. <)

Prerequisites/Corequisites: 1.2Mb Diskette Drive or 20Mb Fixed Disk (#1046 or #1057) for use with any Auxiliary Microcode Diskette.

- Central Site Diskette Distribution Aid: Specify #9006 for the designated central site 3174, allowing it to obtain all levels and combinations of 3174 microcode, microcode RPQs, and DSL device microcode. It can then customize for any network 3174 serviced from the central site. (This feature is available via MES.)

## SPECIAL FEATURES

Special features ordered before a machine is shipped are set up by IBM. Special features ordered after a machine is shipped are set up in the field by the customer; instructions are provided.

### Configuration Support-A Multiple Sessions and Storage Considerations

- Multiple Sessions Using the MLT Function:

For each terminal attached to the 3174, select the appropriate weighting factor in the following table. The sum of the weighting factors for a given 3174 determines the required level of MLT (level 0, 1, 2, or 3) to support the selected MLT sessions.

MLT Weighting Factors Based on Display Characteristics	Number of MLT Sessions/Display				
	1	2	3	4	5
Model 2; w/o EAB	0	3	6	9	12
Model 2; with EAB	0	5	10	15	20

Model 3, 4, or 5; w/o EAB	0	5	10	15	20
Model 3, 4, or 5; with EAB	0	9	18	27	36

For MLT level 0, the sum of weighting factors is 0.

For MLT level 1, the sum of weighting factors must not exceed 45.

For MLT level 2, the sum of weighting factors must not exceed 90.

For MLT level 3, the sum of weighting factors must not exceed 291.

- Storage Requirements by Feature and Function Combinations:

Any one of following feature combinations is operable within its listed storage requirement. (Features/functions not shown in the following lists, do not increase storage requirements above that listed below.)

### Legend For Storage Figure:

AEA = Asynchronous Emulation Adapter (#3020)  
 CSCU CC = Central Site Customizing Utility at a "Central Site Control Unit" (offline)  
 CDIS = Control Diskette In Storage (optional function of CSCU)  
 CSCM CC = Central Site Change Management at a "Central Site Control Unit"  
 CSCM NC = Central Site Change Management at a "Network Control Unit"  
 DSK = 1.2Mb Diskette Drive (either base or feature)  
 FD1 = One 20Mb Fixed Disk Drive (#1056)  
 FD2 = Two 20Mb Fixed Disk Drives  
 FD1/2 = Either one or two 20Mb Fixed Disk Drives  
 MLTn = Multiple Logical Terminal Level 1, 2, or 3  
 BASE = All except functions listed above

- Function Combinations That Fit Within 1Mb of Storage:

\* CSCU CC (DSK or FD1)  
 \* (BASE)  
 \* (BASE) + MLT1  
 \* (BASE) + MLT2  
 \* (BASE) + CSCM NC (DSK or FD1/2)  
 \* (BASE) + CSCM CC (DSK only)  
 \* (BASE) + MLT1 + CSCM NC (DSK or FD1/2)  
 \* (BASE) + MLT1 + CSCM CC (DSK only)  
 \* (BASE) + AEA  
 \* (BASE) + MLT1 + AEA

- Function Combinations That Require 1.5Mb of Storage:

\* CSCU CC (FD2)  
 \* (BASE) + MLT3  
 \* (BASE) + CSCM CC (FD1/2)  
 \* (BASE) + MLT1 + CSCM CC (FD1/2)  
 \* (BASE) + MLT2 + CSCM NC (DSK or FD1/2)  
 \* (BASE) + MLT2 + CSCM CC (DSK or FD1)  
 \* (BASE) + MLT3 + CSCM NC (DSK or FD1/2)  
 \* (BASE) + MLT3 + CSCM CC (DSK only)  
 \* (BASE) + MLT2 + AEA  
 \* (BASE) + MLT3 + AEA  
 \* (BASE) + AEA  
 \* (BASE) + CSCM NC (DSK or FD1/2)  
 \* (BASE) + AEA  
 \* (BASE) + MLT1 + AEA  
 \* (BASE) + MLT1 + CSCM NC (DSK or FD1/2)  
 \* (BASE) + MLT1 + AEA

- \* (BASE) + MLT2 + CSCM CC (DSK or FD1) + AEA
- \* (BASE) + MLT2 + CSCM NC (DSK or FD1/2) + AEA
- \* (BASE) + MLT2 + CSCM CC (DSK or FD1)

● Function Combinations That Require 2Mb of Storage:

- \* CSCU CC + CDIS (DSK)
- \* (BASE) + MLT2 + CSCM CC (FD2)
- \* (BASE) + MLT3 + CSCM CC (FD1/2)
- \* (BASE) + MLT1 + AEA + CSCM CC (FD2)
- \* (BASE) + MLT2 + AEA + CSCM CC (FD2)
- \* (BASE) + MLT3 + AEA + CSCM NC (DSK or FD1/2)
- \* (BASE) + MLT3 + AEA + CSCM CC (DSK or FD1/2)

● Functions Combinations that require 2.5Mb of Storage:

- \* CSCU CC + CDIS (HF1/2)

**512Kb Storage Expansion (#1011):** Provides an additional 512Kb of control storage for features, functions, and RPQs that use more than the 1.0Mb base storage. Maximum: Two (see "Limitations"). Limitations: Two card slots are provided for storage expansion. The slots can be used for this feature or #1012, therefore the sum of #1011 and #1012 cannot exceed two. 32K addresses between 2.0M and 2.5M are reserved for control unit usage. The 1.0Mb Storage Expansion feature (#1012) should be considered, in lieu of this feature, to accommodate future functional growth and for the most efficient use of the available card slots.

**1.0Mb Storage Expansion (#1012):** Provides an additional 1,024Kb of control storage for features, functions and RPQs that use more than the 1.0Mb base storage. This feature is recommended to facilitate generating customized control diskettes for network 3174 Control Units through the Central Site Customizing procedure. Maximum: Two (see "Limitations"). Limitations: Two card slots are provided for storage expansion. The slots can be used for this feature or #1011, therefore the sum of #1011 and #1012 cannot exceed two. 32K addresses between 2.0M and 2.5M are reserved for control unit usage.

**1.2Mb Diskette Drive (#1046):** Provides approximately 1.2Mb of additional diskette storage via a second diskette drive for high-capacity diskettes. This feature or the 20Mb Fixed Disk Drive feature (#1056) is a prerequisite to support the following features and functions of the 3174 subsystem: Asynchronous Emulation Adapter feature (#3020), attachment of any terminal that requires downstream load of microcode from the control unit (e.g., 3179-G), use of the Central Site Customization procedure, use of the Merge Downstream Load procedure, and use of the Full Copy or Modify and Copy facilities of the Copy Files procedure. This feature is not required to support other procedures, but can enhance their usability and reduce the time required to execute many of them due to the reduction or elimination of diskette swapping on a single-drive control unit. Maximum: One. See "Supplies" section for additional diskettes.

**20Mb Fixed Disk Drive (#1056):** Provides 20Mb of file storage. It supports all the functions provided by the 1.2Mb diskette drives, including control unit microcode IML, microcode downstream load to terminals and features that require it, and full support of all utility procedures. This feature is not a prerequisite for the Central Site Customizing Utility or Central Site Change Management, but their usability is significantly improved when it is used. Maximum: Two. Limitation: 3174 Configuration Support-S microcode for the IBM Token-Ring Network 3270 Gateway feature does not support the 20Mb Fixed Disk Drive feature.

**Asynchronous Emulation Adapter (#3020):** Provides an adapter with a microprocessor, storage and control logic, an I/O panel with eight EIA 232-C connectors and a diskette containing the microcode for the adapter. (This microcode is the same that is provided on Auxil-

iary Microcode Diskette #9015, which should not be ordered when #3020 is ordered.) An ASCII terminal or host may be attached to each port using switched or nonswitched (direct connect or dedicated line) transmission facilities. The adapter supports:

- ASCII Terminal Emulation: 3270 Displays can emulate a 3101 or DEC VT100 display and 3270 Printers can emulate an ASCII printer for connection to ASCII hosts or public data networks.
- 3270 Terminal Emulation: ASCII displays can emulate a 3178 Model C2 or 3279 Model 2A (4-color display) and ASCII printers can emulate a 3287 Model 2 for connection to an IBM host.
- ASCII Pass-Through: ASCII displays and printers can connect to ASCII hosts and public data networks through the adapter.

The adapter supports full-duplex, character mode, asynchronous transmission of seven-bit ASCII (ANSI 3.4, 1977) data with parity. Odd, even, mark, space, and no-parity coding are supported. Each port provides an EIA 232-C electrical interface and supports transmission speeds of 300, 600, 1200, 2400, 4800, 9600 and 19,200 bps via modems over nonswitched and switched communications facilities or via direct connection without modems. Transmit and receive speeds must be the same. Autobaud detect and XON/XOFF, DTR, and CTS asynchronous flow controls are supported.

Ports are configurable in any combination of ASCII Terminal Emulation, 3270 Terminal Emulation and ASCII Pass-Through.

ASCII Terminal Emulation for display terminals: 3270 CUT mode displays with a 1920 byte or larger buffer and 3270 PCs operating in CUT mode are supported for 3101 and DEC VT100\* display emulation.

\* Registered trademark for Digital Equipment Corporation.

ASCII display emulation provides the following support:

- Full-duplex character mode data transmission.
- 24 lines at 80 character per line.
- Operator indicator line.
- Mapping of the 3270 Display keyboard.
- Data stream mapping.
- Function keys.
- Typematic keys.
- ALT key (3101).
- Caps Lock key (VT100).
- CTRL key (VT100).
- Break key (long and short for VT100).
- ASCII display keyboard setup options that have equivalent 3270 keyboard setup functions.
- Specification by controller customization of terminal setup options which can be supported on the 3270 Display.

The 3101 functions and keys that are not supported are:

- Half-duplex transmission and functions associated with half-duplex operation.
- Block Mode and keys active in Block Mode.
- Reverse video.
- Local mode.
- Transparent mode.
- Auxiliary printer port and associated keys.

The DEC VT100 functions and keys that are not supported are:

- Keys associated with setup mode which do not have equivalent 3270 keys.
- Interlace Mode.
- Screen Mode (Reverse and Normal).
- Set Character Set.
- Invoke Confidence Test.
- Attached printer and Hard Copy key.

IBM typewriter, APL, and text keyboards are supported via specific keyboard maps for emulating the 3101 or the DEC VT100. Keys that are not applicable to ASCII display emulation are not active.

See the "3174 Subsystem Control Unit Asynchronous Emulation Adapter Introduction", GA23-0331, for more detailed information on supported keyboards and their mapping.

ASCII Terminal Emulation for printers: The 3287 Models 1 and 2, 3262 Models 3 and 13, 3268 Model 2 and 4224 Models 201 and 202

are supported for ASCII printer emulation. ASCII control codes for the following functions are supported: Line feed, form feed, carriage return, bell, and tab-skip to the next multiple of eight characters.

3270 Terminal Emulation for displays terminals: The following ASCII displays are supported for 3270 Terminal Emulation: 3101, 3151 as a 3161 or 3162 depending on the model, 3161, 3162, and 3163, DEC VT52, VT100 and VT200 (emulating a VT100), TeleVideo(1) 912 and 970, Lear Siegler ADM(2) 3A, ADM 5, ADM 11, ADM 12 and 1178, ADDS Viewpoint(3) A-2 and Viewpoint 78, Esprit-Hazeltine(4) 1500, and Esprit(5) 78, and Hewlett Packard(6) 2621. The 3164 is supported for 3279 Model 2A emulation (four colors). The DEC VT241 operates in two colors only.

1. Registered trademark of TeleVideo Systems, Inc.
2. Registered trademark of Lear Siegler, Inc.
3. Registered trademark of Applied Digital Systems, Inc.
4. Registered trademark of Hazeltine Systems, Inc.
5. Registered trademark of Esprit Systems, Inc.
6. Registered trademark of Hewlett Packard.

The user has the choice of a specific map designed for each ASCII display or a universal keyboard map. The ASCII display keyboards are not locked during a screen write. This enables keystrokes to be entered while the screen is being updated for greater keying productivity.

An operator indicator status line is provided on the 25th line for the ASCII displays that provide an accessible 25th line. For the others, an escape sequence is provided to display the operator indicator information on the 24th line. The indicator line can be toggled on and off when the 24th line is used.

IBM Personal System/2 systems and IBM Personal Computers meeting the attachment requirements and using a program that emulates one of the supported displays will be supported for 3270 Terminal Emulation. Other personal computers using a program that emulates one of the supported displays and other displays meeting the attachment requirements and matching the keyboard map, the graphics codes and the control sequences for a supported display for cursor positioning, line erase, screen erase, terminal setup and reset, highlighting (if supported), and operator status line control (if supported) will be supported.

Non-IBM devices may be attached to this emulation adapter under the provisions of the IBM Multiple Supplier Systems Bulletin. It is the customer's responsibility to determine that the emulation program provides identical function and operation as the emulated supported display.

3270 Terminal Emulation for printers: The 4201 Proprinter and Proprinter II, 4202 Proprinter XL, 4207 Proprinter X24 and 4208 Proprinter XL24 are supported for 3270 Terminal Emulation. The serial interface feature is required in order to attach to the Asynchronous Emulation Adapter.

Other ASCII printers that meet the attachment requirements and conform to the following characteristics will be supported for 3270 Terminal Emulation. Supports uppercase and lowercase alphabets or, if not, folds lowercase to uppercase. The printer must have a minimum of 80 print positions and should support the maximum line length sent by the application program. The following ANSI commands must be supported: Carriage Return (Control M, hex 0D), Line Feed (Control H, hex 0A), and Bell (Control G, hex 07). Carriage Return must not generate a Line Feed nor can a Line Feed generate a Carriage Return. The printer must not be dependent on any delay characters to allow for mechanical motion. Printers must use one of the flow control procedures supported by the adapter or be able to print at the full line speed.

ASCII Pass-Through: This option provides the connection of an ASCII terminal to an ASCII host or network through the adapter. The 7-bit data character is unchanged. The adapter flow controls must be used. The terminal and host lines can use different transmission speeds, parity options, number of stop bits, and flow controls.

Host Attachment: ASCII host attachment is via any port of any adapter on the same 3174 as the ASCII or 3270 terminals. IBM host attachment is via the host attachment interface of the 3174 in which the adapter is installed. A specific path can be specified through

control unit customization or a Destination Menu is provided to enable the terminal operator to select the desired host attachment.

Switched line ports can be collected into pools to provide more efficient utilization of dial facilities. Access to an ASCII host or public data network can be provided dynamically through switched port selection when a request is received from a 3270 or ASCII display. ASCII display dial-in ports may be included in the switched port pools for increased utilization if desired.

Camp-on (restarting a connection request when a port becomes available is supported for access requests to the 3270 host.

Online Tests, Error Logs and Alerts: Online tests will be available at the controller to provide status and error information for the adapter. Errors that can arise during asynchronous device operation will be logged and ALERTS generated in the same fashion as for 3270 devices.

Modems: In general, all leased lines, limited distance and switched line modems that provide full-duplex asynchronous transmission, support equal transmit and receive speeds and conform to EIA 232-C specification on the pins shown below should operate satisfactorily.

- 1 - GND - Frame Ground
- 2 - TD - Transmit Data
- 3 - RD - Receive Data
- 4 - RTS - Request to Sent
- 5 - CTS - Clear to Send (optional)
- 6 - DSR - Data Set Ready
- 7 - SG - Signal Ground
- 8 - CD - Carrier Detect
- 20 - DTR - Data Terminal Ready
- 22 - RI - Ring Indicate
- 25 - BSY - Busy Out (optional)

The IBM 5841 and 5842, the Hayes 300 and 1200 and the Micom 3012 and 3024 intelligent modems are supported for autodial to ASCII hosts via CBXs, PBXs and the public switched network. The dial strings may be stored in the 3174 at customization or entered from the 3270 or ASCII display keyboard.

The 5841 cannot be used in switched port pools described in the "Host Attachment" section.

Other intelligent modems that use the "AT" or the Micom command set and meet the proceeding requirements will also be supported for autodial. Non-IBM modems may be attached to this emulation adapter under the provisions of the IBM Multiple Supplier Systems Bulletin.

Manual dial from a 3270 or ASCII display keyboard is supported for modems which accept dial commands as sequences of ASCII codes over the data leads and which return responses through the data leads. No lead changes are permitted during dialing.

Security: The Asynchronous Emulation Adapter provides password protection for access from ASCII displays via switched line ports. In addition, the adapter provides features that can be used with host application systems and programs to implement security and control functions at the host.

User management is responsible for evaluation, selection and implementation of security features, administrative procedures and appropriate controls in application systems and communication facilities.

Maximum: Three. Prerequisite/Corequisite: (1) 1.2Mb Diskette Drive or 20Mb Fixed Disk optional feature (#1046 or #1056), and (2) Base configuration support microcode released in conjunction with this feature. Limitations: (1) Cannot be installed with the IBM Token-Ring Network 3270 Gateway optional feature (#3025). (2) When non-SNA protocols are used to communicate with an IBM host, the maximum number of terminals supported for concurrent communications is 32. This limitation includes both IBM 3270 terminals and ASCII terminals emulating 3270 terminals. Performance Considerations: Response times when this feature is used will depend on many variables including the number and types of terminals attached, the transaction rates and contents, and system parameters such as RU lengths, pacing, etc. "Performance Guide-

lines for IBM 3X74 Attached Workstations", ZZ20-4167, will be updated to include Asynchronous Emulation Adapter information.

**IBM Token-Ring Network 3270 Gateway (#3025):** (Models 1L, 1R, 2R) Provides for data passage between an IBM host and Token-Ring Network. It includes an adapter, a 2.4m (8 ft) communications cable, and 3174 Configuration Support-S microcode, which consists of two control diskettes containing microcode to connect and manage an IBM Token-Ring Network downstream of the control unit, and one Utility/Diagnostic diskette for on-site subsystem problem determination. This feature provides the capability of up to 140 Token-Ring attached devices, as PU 2.0 nodes, to communicate with an IBM host. Any combination of the following Token-Ring attached devices are supported by this feature:

- 3174 Models 3R or 53R
- IBM PC using IBM PC Emulation Program Version 3
- IBM PC using APPC/PC (as a PU 2.0 node)
- System/36 with the LAN Attachment Feature, and using 3270 emulation or APPC (as a PU 2.0 node)
- IBM PC using IBM Operating System/2 Extended Edition Version 1.1
- IBM PC or 3270 PC using 3270 Workstation Program Version 1.1

The number of SNA logical units supported by each PU and the protocols used by these LUs are transparent to this feature. Using the Model 1L, each PU Type 2.0 attached to the Token-Ring appears to the host as a channel-attached 3270 SNA control unit having its own subchannel address. On a Model 1R or 2R, these PU Type 2.0s on the Token-Ring appear as SDLC multi-dropped 3270 SNA control units. 3174 Models 3R and 53R attached to the Token-Ring can attach up to 32 and 16 workstations, respectively. This capability is available in Release 2.0 on Models 1R and 2R using SNA/SDLC protocol in data half-duplex point-to-point or multipoint modes on duplex or half-duplex nonswitched facilities. SNA/X.25 protocol is not supported. The remote gateway can attach to a 308X, 3090, 4361, 4381, or 9370 via a 3270 or 3725 Communications Controller. The 3174 can also attach to the 4361 via its Communication Adapter or to the 9370 via the Telecommunications Subsystem Controller.

The number of devices using this capability is dependent on available 3174 storage and end-user response time requirements. The performance of the remote gateway is affected by the polling overhead of the SDLC multidrop implementation; factors affecting performance are line speed, distance from the Communications Controller or Adapter, application transaction characteristics, and the number of PUs being polled.

Except for response time considerations, this feature does not affect the operation of the displays, printers, or workstations directly attached to the 3174.

**Maximum:** One. **Prerequisites/Corequisites:** At least one Storage Expansion feature (#1011 or #1012). The amount of storage expansion is determined by the number of SNA PUs on the Token-Ring that are defined to the ACF/VTAM for host sessions. The maximum number of PUs that can be defined is 140. **Storage Requirements:**

- For the Model 1L:
  - Up to 28 PUs: One #1011 (Minimum required)
  - Up to 72 PUs: One #1012 (Minimum required)
  - Up to 116 PUs: One #1011 plus one #1012
  - Up to 140 PUs: Two #1012 (Maximum supported)
- For the Model 1R and 2R:
  - Up to 72 PUs: One #1011 (Minimum required)
  - Up to 140 PUs: One #1012 (Maximum supported)

**Limitations:** (1) Configuration Support-A, Release 1 will not operate in a machine that has the Token-Ring adapter associated with this feature installed; Release 2, or higher, is required. The Gateway function is not available when Configuration Support-A is loaded. (2) 3174 Configuration Support-S Release 2, which is shipped with this feature and provides the gateway function, contains all the applicable functions of the 3174 Configuration Support-A, Release 2. The enhancements announced for Release 3 are not provided. Release 2.1 of Configuration Support-S adds the Central Site Customizing Utility procedure. (3) The 3174 Configuration Support-S

microcode which is shipped with this feature does not support the 20Mb Fixed Disk Drive, Multiple Logical Terminal, or Central Site Change Management functions. (4) Cannot be installed with Asynchronous Emulation Adapter optional feature (#3020).

**Performance considerations:** For performance reasons, a customer may elect to limit the number of SNA PUs that concurrently pass traffic through the gateway to a number less than the number shown above. Consult "Performance Guidelines for IBM 3X74 Attached Workstations", ZZ20-4167, or use the HONE AID FIVE3270 to evaluate the actual performance to be expected in a desired configuration and user application/host environment.

**Type 1 Teleprocessing Communication Adapter (#3040):** (Models 1L, 3R) Provides a Type 1 communication adapter and a 6m (20 ft) EIA RS-232-C/CCITT V.24 communication cable. This feature, together with the appropriately configured microcode, enables these 3174 models to operate in an alternate configuration on teleprocessing facilities as a Model 1R. The host appearance of this configuration is also as a 3174 Model 1R. When this feature is installed in a 3174 that also has the IBM Token-Ring Network 3270 Gateway feature (#3025) installed and Configuration Support-S, Release 2.0 or 2.1 loaded, the gateway facilities provided in that feature are fully available. **Maximum:** One. **Prerequisites:** Two appropriately configured Control diskettes (one for the primary configuration, and one for the alternate configuration as a Model 1R). **Limitations:** (1) Cannot be installed with #3041, or 3043, (2) Cryptographic sessions via the Encrypt/Decrypt feature (#3680) are not supported, (3) IML of multiple configurations (i.e., the primary and the alternate) cannot be from the 20Mb Fixed Disk Drive (#1056), (4) Concurrent operation through this feature and the host interface provided in the base product is not supported, (5) Management and transmission of microcode for the alternate Model 1R configuration via Central Site Change Management are not supported.

**Type 1 Teleprocessing Communication Adapter (#3041):** (Models 1L, 3R) Provides a Type 1 communication adapter and a 6m (20 ft) CCITT V.35 communication cable. This feature, together with the appropriately configured microcode, enables these 3174 models to operate in an alternate configuration on teleprocessing facilities as a Model 1R. The host appearance of this configuration is also as a 3174 Model 1R. When this feature is installed in a 3174 that also has the IBM Token-Ring Network 3270 Gateway feature (#3025) installed and Configuration Support-S, Release 2.0 or 2.1 loaded, the gateway facilities provided in that feature are fully available. **Maximum:** One. **Prerequisites:** Two appropriately configured Control diskettes (one for the primary configuration, and one for the alternate configuration as a Model 1R). **Limitations:** (1) Cannot be installed with #3040, or 3043, (2) Cryptographic sessions via the Encrypt/Decrypt feature (#3680) are not supported, (3) IML of multiple configurations (i.e., the primary and the alternate) cannot be from the 20Mb Fixed Disk Drive (#1056), (4) Concurrent operation through this feature and the host interface provided in the base product is not supported, (5) Management and transmission of microcode for the alternate Model 1R configuration via Central Site Change Management are not supported.

**Type 2 Teleprocessing Communication Adapter (#3043):** (Models 1L, 3R) Provides a Type 2 communication adapter and a 6m (20 ft) CCITT X.21 (V.11) communication cable. This feature, together with the appropriately configured microcode, enables these 3174 models to operate in an alternate configuration on teleprocessing facilities as a Model 2R. The host appearance of this configuration is also as a 3174 Model 2R. When this feature is installed in a 3174 that also has the IBM Token-Ring Network 3270 Gateway feature (#3025) installed and Configuration Support-S, Release 2.0 or 2.1 loaded, the gateway facilities provided in that feature are fully available. **Maximum:** one. **Prerequisites:** Two appropriately configured Control diskettes (one for the primary configuration, and one for the alternate configuration as a Model 2R). **Limitations:** (1) Cannot be installed with #3040, 3041, (2) Cryptographic sessions via the Encrypt/Decrypt feature (#3680) are not supported, (3) IML of multiple configurations (i.e., the primary and the alternate) cannot be from the 20Mb Fixed Disk Drive (#1056), (4) Concurrent operation through this feature and the host interface provided in the base product is not supported, (5) Management and transmission of microcode for the alternate Model 2R configuration via Central Site Change Management are not supported.

**Terminal Multiplexer Adapter (#3103):** Provides an 8-port adapter to attach category "A" displays, printers, or workstations via RG-62A/U coaxial cable or IBM Cabling System media. Maximum: Four. Limitations: The maximum distance between the control unit and terminals attached via this feature is 1.5km (4,920 ft) when RG-62A/U coaxial cable is used, or 1.0km (3,280 ft) when IBM Cabling System Data Grade Media is used (assuming a balun is used at the terminal end of the cable). (Canada only) The maximum distance is 274m (900 ft) when using twisted-pair telephone wire. <)

**Encrypt/Decrypt Adapter (#3680):** (Models 1R, 2R, 3R) Provides an adapter to encrypt and decrypt data between SNA nodes. Encryption conforms with the United States National Bureau of Standards Data Encryption Standard (DES). Maximum: One. Prerequisites/Corequisites: 4.14V Mercury battery, P/N 1743456. (One is shipped with feature.) Limitations: Not for use with distributed function terminals. See "SUPPLIES" for additional or replacement batteries.

## MODEL CONVERSIONS

Model conversions are available as indicated below. No other changes are possible. They are set up by the customer, using the instructions supplied.

**Conversion to Model 1R:** (Applicable to Models 2R and 3R) Provides a Type 1 communications adapter and a Model 1R nameplate. A 6m (20 ft) EIA RS-232-C/CCITT V.24 communications cable is shipped, unless a CCITT V.35 communications cable is specified.

- Specify #9000 for CCITT V.35 Communications Cable.

**Conversion to Model 2R:** (Applicable to Models 1R and 3R) Provides a Type 2 communications adapter, a Model 2R nameplate, and a 6m (20 ft) communications cable.

**Conversion to Model 3R:** (Applicable to Models 1R and 2R) Provides a Type 3 communications adapter, 3174 Configuration Support-A microcode (Release 2 or higher), a Model 3R nameplate, and a 2.4m (8 ft) communications cable.

## ACCESSORIES

Accessories can be ordered from country Direct Marketing Centers or other responsible supplies marketing group.

**Communication Cables:** A communication cable connects the 3174 to a modem or other data circuit-terminating equipment (DCE). Accessory communication cables for the EIA RS-232/CCITT V.24 and CCITT V.35 electrical interfaces are available for 3174 Model 1R; accessory communication cables for the CCITT X.21 electrical interface are available for the 3174 Model 2R. Cables in 6m (20 ft) and 12m (40 ft) lengths are available. Order both the cable (by part number), and the "3174 Model and Interface Conversion Customer Setup Instructions" (by publication order number).

- Cable, RS-232/V.24, 6m (20 ft) - P/N 6423153
- Cable, V.35, 6m (20 ft) - P/N 6423325
- Cable, X.21, 6m (20 ft) - P/N 6168155
- Cable, RS-232/V.24, 12m (40 ft) - P/N 6423154
- Cable, V.35, 12m (40 ft) - P/N 6423327
- Cable, X.21, 12m (40 ft) - P/N 6168156
- CSU Instructions, Canadian/French - GA09-0371
- CSU Instructions, English - GA23-0295
- CSU Instructions, French - GA11-0509
- CSU Instructions, Spanish - GA10-8843
- CSU Instructions, Japanese - N: GA23-0295

**Charges:** For local charges, consult your IBM marketing representative.

**IBM 3270 DPC-T3 Adapter (P/N 83X9758):** A cable adapter assembly that permits direct attachment to telephone twisted pair wire, that meets the IBM Cabling System Type 3 specifications, up to a maximum distance of 275m (900 ft.). It is 4.6m (15 ft.) in length with an IBM Dual Purpose Connector (DPC) at one end and a miniature six-pin modular telephone connector on the other end. The telephone connector can be cut off, and the wire inserted directly into telephone punch-down blocks that are capable of accepting stranded telephone wire. The accessory can also be used at the terminal end of the wire provided the terminal has an IBM Dual Purpose Connector (DPC). (Canada only) Otherwise, a CTPA is required. <)

**Ordering:** Order via NDD DRO or via Distributors authorized to market the IBM Cabling System components. Minimum order quantity is one package which contains ten IBM 3270 DPC-T3 Adapter assemblies.

## MACHINE ELEMENTS (NONE)

## SUPPLIES

None required with the machine order.

Supplies can be ordered from country Direct Marketing Centers or other responsible supplies marketing group.

**Battery, Mercury (P/N 1743456):** Provides 4.14V mercury battery for the Encrypt/Decrypt Adapter (#3680).

**Diskettes (P/N 6109660):** Provides a slipcase (SC) containing ten blank 5-1/4 inch diskettes with 1.2Mb of usable capacity for 3174 Diskette Drives.

**IBM 3174 Diskette Identification Labels (GX23-0389):** Provides five labels to uniquely identify diskettes used with the 3174.

**Diskette Mailer (P/N 2656102):** Provides one diskette mailing container.

**X.21/X.25 Keyboard Labels:** Provides 12 sets of seven keyboard stick-on labels (on one sheet) for X.21 switched network or X.25 network operation via a 3174 Model 1R or 2R. Order both the labels (by part number), and installation instructions (by publication order number).

- Sheet of Labels - P/N 1743595
- Instructions, English - G126-0158
- Instructions, Canadian/French - G509-2504

**Charges:** For local charges, consult your IBM marketing representative.

## CABLING INFORMATION

**Coaxial Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "Installation and Assembly of Coaxial Cable and Accessories" for Attachment to IBM Products, GA27-2805.

**IBM Cabling System:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System Planning and Installation Guide", GA27-3361.

**(Canada, Australia, Japan only) Twisted Pair Telephone Wire:** For proper identification, installation, and application of cable, refer to "IBM/Rolm Planning and Installation Guide for 3270 Coax to Twisted Pair Adapter", GA27-3722. <)

## 3174 SUBSYSTEM CONTROL UNIT MDLS 51R, 52R, 53R

### PURPOSE

Small-cluster control units for remote or local area network attachment of up to 16 IBM 3270 Information Display System displays, printers, and workstations to IBM host processors via telecommunications links or IBM Token-Ring Networks. An optional feature provides for attachment to ASCII terminals and hosts via telecommunications links.

### MODELS 51R, 52R, 53R

**Model 51R:** EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment.

**Model 52R:** CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment.

**Model 53R:** IBM Cabling System interface (IEEE 802.5/ECMA 89) for IBM Token-Ring Network attachment.

### Prerequisites:

1. A control unit terminal (CUT) or 3270-PC operating in CUT mode attached to port 0 is required to customize subsystem microcode or to run offline diagnostics from a display.
2. A CUT or 3270-PC operating in CUT mode attached to any port is required to perform subsystem RAS tests.
3. A CUT or 3270-PC operating in CUT mode attached to any port is required to establish X.21 switched network and X.25 sessions. After session establishment, all terminals, CUT and DFT, can use the established session.
4. An IBM 3299 Terminal Multiplexer is required to attach more than nine terminals to these models.
5. The Model 53R requires 3174 Configuration Support-A, Release 2 (or higher) microcode, which is shipped with each machine.

**Customer Setup (CSU):** All models and features ordered via MES after the machine is shipped from IBM are designated as Customer Setup.

### HIGHLIGHTS

The 3174 is a non-programmable subsystem control unit to attach IBM 3270 Information Display System displays, printers, and workstations to IBM host processors. An optional feature provides for attachment to ASCII terminals and hosts. The 3174 runs under control of its integrated microprocessor and associated control program, which can be customized by the user to meet specific requirements.

Units are shipped with a host-attachment interface, 1.0Mb of control storage, a 1.2Mb diskette drive, and a 9-port terminal adapter to attach supported devices (see "Terminal Attachment") either directly (nine terminals), or via two IBM 3299 Terminal Multiplexers (16 terminals), or via a combination of one terminal multiplexer (eight terminals) and eight directly attached. The Model 51R provides both EIA RS-232 (CCITT V.24) and CCITT V.35 interfaces. The desired interface is enabled during IML of the control unit, based on the type of communication cable (RS-232 or V.35) that is attached. Models 51R and 52R are shipped with a 6m (20 ft) communications cable, and Model 53R is shipped with a 2.4m (8 ft) communications cable. All units are shipped with a 4.3m (14 ft) power cord.

Characteristics of the 3174 Models 51R, 52R, and 53R include:

- Function base equivalent to the 3274 Model 61C with Configuration Support D microcode, except:

- A Loop Adapter is not offered.
- An Encrypt/Decrypt Adapter is not offered.
- IBM 3278 Model 1 displays (960-character buffer) and use of the 960-character buffer format by printers are not supported.
- (Canada only > IBM 3278/3279 PC Attachment features (#5315, #5316/#5325, #5326) are not supported. <)

### • New features and functions, including:

- Model for attachment to the IBM Token-Ring Network.
- Multiple Logical Terminals support for interaction with up to five host sessions in base microcode. Four levels of MLT support are selectable at customization: MLT Level 0 allows no MLT; MLT Level 1 allows up to 16 Model 2 non-EAB (Extended Attribute Buffer - display characteristic) displays, each with two sessions; MLT Level 2 allows up to 16 EAB displays, each with two sessions; MLT Level 3 allows up to 32 EAB displays, each with two sessions. Other combinations are possible (refer to Customization documentation). The maximum number of devices for Models 51X, 52X, or 53X is 16. See the Configuration Support-A Storage Chart under Special Features for storage requirements for MLT and other features/functions.
- Support for up to 84 SNA LU's.
- Response Time Monitor in 3174 base hardware.
- IBM Token Ring Network 3270 Gateway feature (Release 2.0) for Models 51R and 52R to provide data passage between an IBM SNA host and terminals attached to an IBM Token-Ring Network downstream of the 3174.
- Asynchronous Emulation Adapter feature that provides 3270 terminal emulation for communication between ASCII terminals and IBM hosts, and ASCII terminal emulation for communication between IBM control unit terminals (CUTs) or IBM PCs operating in CUT mode and ASCII hosts.
- 3178 Model C30 and C40 keyboard support in base microcode.
- X.21 Short Hold Mode support in base microcode.
- ASCII-8 and ASCII-International character set support in base microcode.
- (APG only > Support for Thai language in base microcode. <)
- Support for the IBM Enhanced Keyboard, available on recent IBM displays, in base microcode.
- X.25 support without the need for additional storage.
- Cabling to devices via direct attachment to IBM Cabling System media. A balun cable assembly is not required.
- A basic 5.25-inch, high-capacity diskette drive, and capacity for another as an optional feature.
- Accommodation for up to 10 microcode RPQs per control unit.
- Mountable in an industry standard rack or on a table top.
- CMOS technology and VLSI circuitry for better RAS characteristics, lower power consumption, and a smaller footprint than 3274 Control Units.
- TP link speeds up to 64K bps.

- 1.0Mb of control storage to accommodate the control program and microcode-selectable functions. Control storage features in increments of 512Kb and 1.0Mb are provided for features, functions, and RPQs that use more than the 1.0Mb base storage.
- 20Mb Fix Disk Drive feature for specified models.
- Improved RAS characteristics:
  - Reliability and availability of the 3174 are enhanced by the following elements:
    - ▲ Built-in microcode and hardware error recovery.
    - ▲ Self-identifying adapters by type number and location at both IML and control unit diagnostic operation.
    - ▲ Uninterrupted IML for non-critical conditions. Complements host-initiated IML under Central Site Change Management.
    - ▲ Continued control unit operation by unaffected portions during faults in the Terminal Adapter, Asynchronous Emulation Adapter, and IBM Token-Ring Network 3270 Gateway Adapter.
    - ▲ Hardware error correction code for storage.
    - ▲ Dynamic storage reconfiguration.
    - ▲ Fewer field-replaceable units.
  - Serviceability of the 3174 is enhanced by the following elements:
    - ▲ Self-configuring offline diagnostics, with automatic or manual selection.
    - ▲ FRU call out at operator's panel and/or display terminal.
    - ▲ Error status codes reported on four, 7-segment light emitting diodes (LED).
    - ▲ Errors time-stamped and logged to the diskette.
    - ▲ Expanded Alerts, including type and location of failing components, specifics of Bind failures, and specifics of failing data streams.
    - ▲ Device attachment media threshold Alerts without the need for a timer special feature.
    - ▲ Logging of executing task and microprocessor priority level upon control unit failures.
    - ▲ Terminal interface driver/receiver wrap capability.
- Improved Customization. Customization of subsystem control units is enhanced through the following elements:
  - A central site customizing facility (see "Central Site Customizing", below, under "Offline Utility Procedures".)
  - Electronic distribution of customization parameters and/or data via the Central Site Change Management function.
  - Use of words and phrases on the customization panels, as opposed to only numbers and symbols.
  - Error messages presented on screen.
  - Optional selection of Printer Authorization Matrix definition panel, with self-explanatory prompts.
  - Reduced number of questions for equivalent function.
  - Reduced diskette swapping.
  - Expanded use of defaults.
  - Reduced machine execution time.
  - Use of full screen with a CUT-mode terminal Model 3 or 4, rather than presentation in a Model 2 format.
- Offline Utility Procedures. 3174-based offline utility procedures to aid in configuring and managing of 3174 microcode and to provide offline diagnostic functions are provided on a Utility/Diagnostic diskette. The procedures are invoked from a 'Master Menu' panel that is displayed on a Control Unit Terminal (CUT) attached to port 0. 3174 offline utility procedures include:
  - Customize the Control Diskette. Provides facilities to configure control unit microcode, define printer authorization matrix, merge RPQs, and modify keyboards.
  - Merge Downstream Load. Provides the ability to merge the microcode provided on individual auxiliary microcode diskettes for the Asynchronous Emulation Adapter feature (#3020) and downstream-load terminals, such as the 3192 "G" Models, on to one downstream load diskette. Use of this procedure requires the 1.2Mb Diskette Drive optional feature (#1046) or 20Mb Fixed Disk Drive optional feature.
  - Copy Files. Through its seven variations, provides a means of duplicating diskettes, copying specific data areas, and copying with configuration modifications from one control diskette to another. The functions of the 3274 "Diskette Processing Aid" RPQ 8K1071 are included in this procedure. The 'Full Copy' and 'Modify and Copy' facilities require the 1.2Mb Diskette Drive optional feature (#1046) or the 20Mb Fixed Disk Drive optional feature A feature is not required for the other Copy Files options, but their usage is enhanced with one, since the need for diskette swapping is reduced.
  - Diagnostics. Provides a full range of offline diagnostics. They are selected from a menu panel when this procedure is invoked.
  - Microcode Upgrade. Provides a process to update a newly released control diskette with the configuration data from a down level control diskette, thus reducing the time required to execute this task.
  - Identify Customizing Keyboard. Expands the types and configurations of keyboards from which the 3174 customization process can be executed.
  - Central Site Customizing. Enhances the management, distribution, and control of microcode for 3174 control units in a network. It provides the ability to create offline, a Central Site Library (CSL) of network control unit data; create, modify, browse, or delete library members; and generate customized control diskettes for mailing to network 3174s. The 1.2Mb Diskette Drive optional feature (#1046) or 20Mb Fixed Disk Drive optional feature (#1056) is required to use this procedure. Although not required, additional storage is recommended to facilitate generating diskettes for network control units by reducing the time and manual intervention required to read individual, duplicate control diskettes. (See "Configuration Support-A Multiple Sessions and Storage Considerations" for details.) This procedure is a prerequisite for Central Site Change Management. It does not support microcode management, distribution, or control for a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway optional feature (#3025) Release 2.0 or lower.
  - Central Site Change Management. Provides electronic distribution of customization parameters and/or data to network 3174's. The Central Site Customizing Utility function in Configuration Support-A, Release 3 is required on a 3174 Model 51R, 52R, or 53R that is designated as the central site control unit. Electronic distribution is via Distributed Systems Executive (DSX) Version 4, Release 1 in the IBM central site host via support in ACF/VTAM Version 3, Release 2. Electronic distribution of customization parameters is to any model of the 3174 in a non-disruptive mode. Electronic distribution of other data may require network site intervention depending on that network 3174's model and/or hardware features installed. The 20Mb Fixed Disk Drive feature is not a prerequisite but is desirable for some 3174's participating in Central Site Change Management. Additional storage may be required when combined with other features (see Configuration Support-A Storage Chart). In addition to providing the electronic distribution support for central site control units, CSCM also provides the complementary support to receive customization parameters and/or data at the network control units. Central

Site Change Management is not available in 3174's with the IBM Token-Ring Network Gateway feature (#3025) installed.

### ● Improved Usability:

- Operator's panel with 10-key numeric pad and four 7-segment light emitting diode (LED) readouts.
- User-friendly problem determination tools, including self-configuring diagnostics, extensive use of program function keys, and formatted displays of configuration data.
- Multi-purpose teleprocessing adapters that provide variable operating speeds, host attachment interfaces, and protocol support.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, and other vendor preparation.
2. Price quotations, installation, and costs (initial and recurring) of common carrier equipment and service.
3. Receipt at the customer's receiving dock, unpacking, and placement of the unit.
4. Procuring and attaching appropriate cables for connections between the Asynchronous Emulation Adapter and terminals/modems.
5. Physical setup, connection of cables to communication lines/modems and IBM CSU devices, setting switches, and check out.
6. Contacting Customer Engineering to make 3174 cable connections to non-CSU IBM units.
7. Performing customization in accordance with IBM-supplied procedures:
  - For initial setup.
  - When made necessary by changes in configuration.
  - For updating control unit diskettes (at customer option).
  - When initializing and updating the keyboard tables using the Keyboard Definition facility of the customization procedure.
8. Setup of features ordered after the unit is shipped from IBM.
9. Using the problem determination procedures provided with the unit prior to calling IBM for service.
10. Following instructions provided by IBM regarding relocation.

**Publications:** See "KWIC Index", G320-1621, or applicable system bibliography.

3270 - GA23-0058  
4300 - GC20-0001  
8100 - GC20-8100

**HONE:** Use the HONE configurator (CF3270) to assist in configuring the 3174 before entering an order.

### TERMINAL ATTACHMENT

All 3174 models use the same terminal attachment interface architectures; they are the same as used by the 3274. Documentation describing the interface between 3X74 control units and their attached terminals is available.

The displays, printers, 3270-PCs, and IBM PCs (and associated emulation software) supported for attachment to the 3174 are listed below. Products and software not specifically listed should be tested by the customer to verify correct operation. Continued improvements in the 3174 and attaching terminals may require micro-

code or hardware updates to the attaching products. Refer to RETAIN for information on product compatibility.

Terminals can attach to 3174 Models 51R, 52R, or 53R via IBM 3299 Terminal Multiplexers, or via IBM 5209 3270-5250 Link Protocol Converters, or via the terminal attachment ports provided on the 3174.

Either RG-62A/U coaxial cable, IBM Cabling System media (Canada, Australia, Japan only) or specified telephone twisted-pair wire (IBM Cabling System Type 3 media) can be used for connections to the 3174. Depending on the type of wire used, the distance between the 3174 and its attached terminals can be up to 1,500m (4,920 ft); when an IBM 3299 is used, the maximum distance can be up to 3000m (9840 ft). The 3174 ports are Dual Purpose Connectors (DPC), which do not require a balun cable assembly to connect terminals via IBM Cabling System Types 1, 2, or 9 media, but some terminals may. (Refer to the appropriate terminal pages.) Using a balun assembly reduces the maximum allowable wire lengths as shown below.

### 3174 Terminal Attachment Maximum Wire Lengths

Number of Baluns	RG-62A/U Coaxial Cable		IBM CABLING SYSTEM MEDIA			
			Types 1 & 2		Type 9	
	m	ft	m	ft	m	ft
0	1500	4920	1500	4920	1000	3280
1	N/A	N/A	1000	3280	667	2186

(Canada Only) IBM Cabling System Type 3 Media (specified telephone twisted-pair wire) can also be used for connections to the 3174. Connection to the telephone twisted pair can be via an IBM/Rolm Coax to Twisted Pair Adapter (CTPA) or equivalent. When one end of the telephone twisted pair is attached to a CTPA, the maximum wire length is 275m (900 ft). <

### DISPLAY AND PRINTER ATTACHMENT

The following displays and printers are supported for attachment to the 3174. (See Note 1.) The Type-Models (prerequisites) Names are:

- \*3178-C10, C20 Display Station
- \*3179-1 Color Display Station
- 3179-G1, G2 Color Display Station
- \*3180-1 Display Station
- \*3191-A1X, B1X, D1X, E1X, L1X, A2X, A3X, B2X, B3X, D2X, D3X, E2X, E3X, L2X, L3X Display Station
- \*3192-C1X, F1X, C2X, C3X, F2X, F3X, Color Display Station
- \*3192-D1X, L1X, D2X, D3X, L2X, L3X Display Station
- 3192-G10, G20, G30, G40 Color Graphics Display Station
- 3193-1, 2 (Note 2) Display Station
- \*3194-C10, C20, D10, D20, H10, H20, H50 Display Terminal
- 3262-3, 13 Line Printer
- 3268-2 Printer
- 3268-2C Color Printer
- \*3278-2, 3, 4, 5 Display Station
- \*3279-S2A, S2B, S3G, 2X, 3X Color Display Station
- 3287-1, 2 (#8331) Printer
- 3287-1C, 2C Printer
- 3290-220, 230, T30 Information Panel
- 3812-2 (#3190) Pageprinter
- 3814-A1, A2, A3, A4 (#1440) Switching Management System
- 4224-201, 202, 2E2, 2C2 Printer
- 4234-1 Dot Band Printer
- 4245-D12, D20 (Note 2) Line Printer
- 4250-1 (Notes 2, 3) Printer
- 4250-2 (Notes 2, 3) 4250/II ElectroCompositor
- 5210-G1, G2 Printer
- (APG only) 5227-11 Printer
- 5578 (Note 4) Japanese Workstation <

\* Control unit terminal (CUT) or terminal that can operate in CUT mode and be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions.

Notes:

1. IBM 3278 Model 1 displays (960-character buffer) and the "960 Character Print Operation" option that is available on some printers are not supported.
2. The high data volumes possible with this device may not be realized when attached to Models 51R and 52R via TP links. It is strongly recommended that the "Performance Guidelines for IBM 3X74 Attached Workstations", ZZ20-4167, be consulted to determine what performance may be expected.
3. Requires 4250 RPQ 7B0980.
4. (APG only) This terminal can operate in CUT mode and be used for customization.<

PERSONAL COMPUTER ATTACHMENT

**IBM 3270-Personal Computers:** The IBM 3270-PCs supported for attachment to the 3174 are listed below. Current host communications programs that support a 3270-PC attached to a 3274 will work unchanged with a 3270-PC attached to a 3174. Any 3270-PC operating in CUT mode can be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions. The Type/Model(s) (Names) are:

5271 All (3270-PC)  
5273 All (3270-PC AT)  
5371 All (3270-PC/G, GX)  
5373 All (3270-PC AT/G, AT/GX)

**IBM Personal Computers:** The following IBM PCs are supported for attachment to the 3174 when emulating the functions of a 3278 Display Station Model 2 or a 3279 Color Display Station Model 2A or S2A through the software listed below. IBM PCs operating in CUT mode (APG only) except for the IBM 5550 family (<) can be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions. The Type/Model(s) /Prerequisite/ (Names) are:

- 5150 All /#5050/ (Personal Computer)
- 5160-068, 078, 086, 087, 088, 089, 267, 268, 277, 278 /#2507 or /#5050/ (Personal Computer XT)
- 5170-068, 099, 239, 319, 339 /#2507 or /#5050/ (Personal Computer AT)
- 5170-599, 739, 919, 939 (Personal Computer AT/370)
- (APG only) > 5540/5550/5560 System (Notes 1, 2) (IBM 5550 Family (as 3270)) (<)
- 6150-20, 25, A25 (RT Personal Computer)
- 6151-10 (RT Personal Computer)
- 8530-021 /#5050/ (Personal System/2 Model 30) .8550-021 /#2000/ (Personal System/2 Model 50) .8560-041, 071 /#2000/ (Personal System/2 Model 60) .8580-041, 071 /#2000/ (Personal System/2 Model 80)
- 9370 (Processor Console)

(APG only) Notes:

1. Requires 3174 RPQ 8K1349, which is shipped with each machine in Japan, for 5550 printer sharing.
2. Can operate in CUT mode and be used for customization.<

**IBM PC 3278/79 Emulation and File Transfer Software:** The IBM PCs listed above are supported for attachment to the 3174 when configured to operate with:

- IBM Personal Computer 3278/79 Emulation Control Program Version 2 (P/N 8665780)
- IBM PC 3270 Emulation Program, Entry Level (P/N 59X9904)
- IBM PC 3270 Emulation Program Version 3 (P/N 59X9969)
- IBM 3270 Workstation Program Version 1.0 (P/N 74X9921) and Version 1.1 (P/N 75X1088)
- IBM RT Personal Computer 3278/79 Emulation Program (PP 5669-052)

- IBM Virtual Machine/Personal Computer Release 2 (P/N 6467040)
- Personal Services/PC Release 1.04 (P/N 6403826) or higher
- VM Bond Release 2 (P/N 6467022)

**IBM PC Host File Transfer Software:** The 3174 supports the following host file transfer programs that allow the IBM PCs listed above to perform file transfers. Refer to the appropriate product documentation for details on the supported configurations.

- PC Bond (PP 5664-298)
- IBM Virtual Machine/Personal Computer Release 2 (PP 5664-319)
- MVS/TSO (PP 5665-311)
- VM/SP (PP 5664-281)
- DISOSS - for MVS (PP 5665-290)
- DISOSS - for VSE (PP 5666-270)
- PROFS Version 2 (PP 5664-309) (Personal Computer Connection Extended)

SYSTEM ATTACHMENT

**Processors:** The 3174 communicates with the following IBM systems and processors using SNA and non-SNA protocols:

SYSTEM/PROCESSOR COMMUNICATION

SYSTEM PRO- CESSOR	REMOTE LINK			TOKEN-RING NETWORK (Model 53R)
	Mdl 51R	Mdl 52R		
	SNA	BSC	SNA	SNA
S/1	X	X	X	-
S/36	X	-	X	-
S/38	X	-	X	-
S/88	X	X	X	-
308X	X	X	X	X
3090	X	X	X	X
4361	X	X	X	X
4381	X	X	X	X
8100	X	-	X	-
(DPPX Only)				
9370	X	X	X	X

Other system/processor attachments may be supported by RPQ, as appropriate. Use the HONE/INFO RPQ application to review for any additional supported systems. Use a search argument of "3174".

**Remote Link Attachment:** 3174 Models 51R and 52R can attach to a 308X, 3090, 4361/4381 or 9370 via an IBM 3720 or 3725 Communications Controller. Attachment to S/1, S/36, S/38, S/88 and 8100 (DPPX only) is via communications features in those products. Refer to their "Machines" pages. Attachment to the 4361 and 937X may also be via its Communications Adapter or to the 9370 Telecommunication Subsystem Controller. A modem or other Data Circuit-Terminating Equipment (DCE) is required, unless the host processor or system provides a method of direct-connection attachment, without the need for a DCE. The Model 51R can also attach via the IBM 3710 Network Controller.

**IBM Token-Ring Network Attachment:** The 3174 Model 53R transmits and receives at four million bits per second using media access protocols conforming with IEEE 802.5 and ECMA 89 standards, and logical-link protocols conforming with IEEE 802.2 standard, over

a baseband token-ring. It can attach to a 308X, 3090, 4361/4381 or 9370 via an IBM 3720 or 3725 Communications Controller with the NCP/Token-Ring Interconnection (NTRI) facility of ACF/NCP Version 4 Release 2, or via a 3174 with the IBM Token-Ring Network 3270 Gateway optional feature (#3025).

**Communications Facilities:** 3174 Models 51R and 52R operate in data half-duplex point-to-point or multipoint modes on duplex or half-duplex nonswitched facilities, and in half-duplex point-to-point mode on switched facilities as listed below. Operation on switched network facilities is supported only through SNA/SDLC. See the M2700 pages for specific country networks that are supported.

## 3174 MODEL 51R:

ELECTRICAL INTERFACE	FACILITY (See M2700 Pages)	LINK/ NETWORK PROTOCOL	MAX. SPEED (bps)
EIA RS-232-C/ CCITT V.24/28 (External clocking required)	D,G	BSC	9.6K
	C,D,E,G	SNA/SDLC	19.2K
		SNA/SDLC (X.21bis)	19.2K
	P	X.25 (X.21bis)	19.2K
CCITT V.35 (External clocking required)	D,G	BSC	9.6K
	D,E,G	SNA/SDLC	64K
	M	SNA/SDLC (X.21bis)	64K
	P	X.25 (X.21bis)	19.2K

## 3174 MODEL 52R:

CCITT X.21	L	SNA/SDLC	48K
	N	SNA/SDLC	64K
	Q	X.25	19.2K

**Modems:** IBM modems to which the 3174 Model 51R can attach include:

### Nonswitched Modems:

3833	2400 bps
3834	4800 bps
3863-1	2400 bps
3864-1	4800 bps
3865	9600 bps
3868-1	2400 bps
3868-2	4800 bps
3868-3	9600 bps
3868-4	9600 bps
5811	2.4/4.8/9.6/19.2K bps (Baseband)
5865	9600 bps
5866	14400 bps
5868	9600 bps
5868	14400 bps

Switched network backup (SNBU) mode of operation is possible using an appropriately featured external modem.

### Switched Network Backup Modems:

3863	2400 bps
3864	4800 bps
3865	9600 bps
5865	9600 bps
5866	14400 bps

### Switched Network Modems (SNA/SDLC only):

3863-2	2400 bps
3864-2	4800 bps

**PTT-Mandatory DCEs:** The 3174 Model 51R attaches to PTT-mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110, and relevant CCITT Recommendations for data transmission speeds. The Model 51R attaches to PTT-mandatory DCEs meeting CCITT Recommendation V.35 and ISO standard 2593.

**Non-IBM DCEs:** Non-IBM DCEs complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35, or X.21 may be attached to Models 51R and 52R under provisions of the IBM Multiple Supplier Systems Bulletin.

**Public Data Networks:** Models 51R and 52R attach to X.21 switched, X.21 nonswitched, and X.25 Public Data Networks as listed in Charts K, L, M, N, P, and Q of the M2700 pages. Keyboard labels are provided with every 3174 Model 51R and Model 52R to facilitate X.21 switched network and X.25 session setup and termination. Extra labels are available; see "Supplies".

**IBM 3710 Network Controller:** The 3174 Model 51R can attach to the IBM 3710 Network Controller as indicated in the chart below. The maximum total cable length permitted between the 3174 and the 3710 is 15m (50 ft).

### 3710 ATTACHMENT:

SPEED (K BPS)	B S C	S D L C	3174 MODEL 51R INTERFACE
3710 FEATURE #7001: 2.4/3.6/4.8/ 7.2/9.6	X	X	RS-232-C (V.24/28)
14.4/19.2	-	X	
3710 FEATURE #7005: 2.4/3.6/4.8 7.2/9.6	X	X	CCITT V.35
14.4/19.2/ 48/56/64	-	X	

**Direct-Connection Attachment:** 3174 Models 51R and 52R can communicate with IBM hosts without the need for modems or other data circuit-terminating equipment. This method of 'direct-connection' attachment is made through the 3174 EIA RS-232-C (CCITT V.24/V.28), CCITT X.21, or CCITT V.35 interface, via appropriate connecting cables, to the direct-connection product's interface. The direct-connection product must provide bit clocking to the 3174.

Products that support direct-connection attachment of the 3174 are listed in the following table. Only the interface features needed by the direct-connection products are listed; they may have prerequisites, therefore the Machines pages for those products should be reviewed.

The maximum, total cable length allowed between the 3174 interface and the host product interface is 122m (400 ft), unless the host product imposes a shorter limit. The physical planning manuals for those products can provide cabling data and other information necessary for direct-connection attachment.

HOST PRO- DUCT	HOST PRODUCT FEATURE NUMBER	SPEED (K bps)	B S C	S D L C	3174 MODEL/ INTER- FACE
3720/ 3721	#4911 (LIC-1)	2.4/4.8/9.6	X	X	51R/ V.24
		19.2	-	X	
	#4931 (LIC-3)	2.4/4.8/9.6	X	X	51R/ V.35
		19.2/38.4/56	-	X	
	#4941 LIC-4A	2.4/4.8/9.6	-	X	52R/ X.21
	#4942 LIC-4B	2.4/4.8/9.6/ 19.2/38.4/56	-	X	52R/ X.21
3725/ 3726	#4911 (LIC-1)	2.4/4.8/9.6	X	X	51R/ V.24
		19.2	-	X	
	#4931 (LIC-3)	2.4/4.8/9.6	X	X	51R/ V.35
		19.2/56	-	X	
	#4941 LIC-4A	2.4/4.8/9.6	-	X	52R/ X.21
	#4942 LIC-4B	2.4/4.8/ 9.6/19.2/56	-	X	52R/ X.21
4361	#4801	2.4/4.8/9.6	X	X	51R/ V.24
8101, 8130, 8140- Mdls A & B	#3701 (FACs 15-16)	2.4/4.8/9.6	-	X	51R/ V.24
	#1550 (FACs 24-26)	2.4/4.8/ 9.6/56	-	X	51R/ V.35
8140- Md1 C	#1621	4.8	-	X	51R/ V.24
	#1614	56	-	X	51R/ V.35
8150	#1733 or #1734	4.8/9.6	-	X	51R/ V.24
	#1742 or #1745	56	-	X	51R/ V.35
9370	#6031	2.4/4.8/9.6	X	X	51R/ V.24

## BASIC CONFIGURATION

The machine is shipped as follows if only mandatory specify codes are selected:

- Power (AC, 1-phase, 50/60 Hz):

Argentina	200-240V
Australia	200-240V
Brazil	100-127V
Canada	100-127V
Chile	200-240V
Japan	100-127V
Mexico	100-127V
New Zealand	200-240V
Venezuela	100-127V
All Others	(Must specify desired power)

- (Except Canada, Mexico, Nicaragua, Japan > Power Cord Plug. Determined by the 3-digit DPMO WT country code. The plug most commonly used in the country is shipped.)
- (Canada, Mexico, Nicaragua only > Power Cord Plug. A non-locking plug is shipped.)
- (Japan only > Power Cord Plug. A locking plug is shipped.)
- Nomenclature: The country code is used to select the language of the nomenclature provided on the operator and power control panels, based on the language most commonly used in that country. The following languages are available:

English	Portuguese
Japanese	Spanish
French	

- Communications Cable: (Model 51R) For the EIA RS-232-C/CCITT V.24 Electrical Interface.
- Two control diskettes containing 3174 Configuration Support A microcode and one Utility/Diagnostic diskette, which is required for 3174 subsystem on-site problem determination.

## SPECIFY

- Specify #2998 (mandatory specify).
- The remainder of the "Specify" section can be ignored if the options described in the "Basic Configuration" section are satisfactory. These specify features are shipped in lieu of the corresponding item(s) listed above. Unless indicated otherwise, these specify features are available only at the time of manufacture.
- (Except Canada > Power (AC, 1-phase, 50/60 Hz). Specify one of the following:
  - 100-127V: #0802
  - 200-240V: #0801 <)
- (Canada, Nicaragua only > Power Cord Plug. Specify #9890 for locking plug.)
- (Mexico only > Power Cord Plug. Specify #9890 for locking plug. Prerequisites: 200-240V Power (#0801). <)
- (Japan only > Power Cord Plug. Specify #9891 for non-locking plug. Limitations: Cannot be installed with 200-240V Power (#0801). <)
- Machine Nomenclature. Specify one of the following:
 

English	#2924	Portuguese	#2933
Japanese	#2930	Spanish	#2931
French	#2928		
- CCITT V.35 Communications Cable: (Model 51R) Specify #9000 for CCITT V.35 Electrical Interface Cable. (This code causes a CCITT V.35 communication cable to be shipped instead of an EIA RS-232/CCITT V.24 cable.)
- Auxiliary Microcode Diskettes: Provides a diskette containing the operational microcode for each of the Distributed Function Terminals (DFTs) and 3174 features listed below. The diskette

must be placed in the optional 1.2Mb Diskette Drive feature (#1046) or loaded on the optional 20Mb Fixed Disk Drive feature (#1056) and be available at all times to automatically provide the DFTs with downstream load services. A merge procedure is provided to combine multiple auxiliary microcode diskettes including that for the Asynchronous Emulation Adapter optional feature (#3020), on to one downstream load diskette. (Auxiliary microcode diskettes are available via MES.)

- Asynchronous Emulation Adapter Microcode Diskette (#9015): (51R, 52R). For 3174 Subsystem Control Units that provide Central Site Library and customizing facilities and do not require the Asynchronous Emulation Adapter function or hardware.
- IBM 3179-G/3192-G Color Graphics Display Station Downstream Load Microcode Diskette (#9016).
- IBM 3193 Display Station Downstream Load Microcode Diskette (#9017).
- IBM 3290 Information Panel Downstream Load Microcode Diskette (#9021).

(Japan only > Specify #9025 for Katakana language. <)

Prerequisites/Corequisites: 1.2Mb Diskette Drive or 20Mb Fixed Disk (#1046 or 1057) for use with any Auxiliary Microcode Diskette.

- Central Site Diskette Distribution Aid. Specify #9006 for the designated central site 3174, allowing it to obtain all levels and combinations of 3174 microcode, microcode RPQs, and DSL device microcode. It can then customize for any network 3174 serviced from the central site. (This feature is available via MES.)

## SPECIAL FEATURES

Special features ordered before a machine is shipped are set up by IBM. Special features ordered after a machine is shipped are set up in the field by the customer; instructions are provided.

## CONFIGURATION SUPPORT-A MULTIPLE SESSIONS AND STORAGE CONSIDERATIONS

- Multiple Sessions Using the MLT Function

For each terminal attached to the 3174, select the appropriate weighting factor in the following table. The sum of the weighting factors for a given 3174 determines the required level of MLT (level 0, 1, 2, or 3) to support the selected MLT sessions.

MLT Weighting Factors Based on Display Characteristics	Number of MLT Sessions/Display				
	1	2	3	4	5
Model 2; w/o EAB	0	3	6	9	12
Model 2; with EAB	0	5	10	15	20
Model 3, 4, or 5; w/o EAB	0	5	10	15	20
Model 3, 4, or 5; with EAB	0	9	18	27	36

For MLT level 0, the sum of weighting factors is 0.

For MLT level 1, the sum of weighting factors must not exceed 45.

For MLT level 2, the sum of weighting factors must not exceed 90.

For MLT level 3, the sum of weighting factors must not exceed 291.

- Storage Requirements by Feature and Function Combinations

Any one of following feature combinations is operable within its listed storage requirement. (Features/functions not shown in the following lists, do not increase storage requirements above that listed below.)

## LEGEND for Storage Figure

AEA = Asynchronous Emulation Adapter (#3020)  
CSCU CC = Central Site Customizing Utility at a "central site control unit" (off line)  
CDIS CC = Control Diskette In Storage (opt. function of CSCU)  
CSCM NC = Central Site Change Management at a "Network Site Control unit"  
CSCM CC = Central Site Change Management at a "Central Site Control unit"  
DSK = 1.2Mb Diskette Drive (either base or feature)  
FD = One 20Mb Fixed Disk Drive (#1056)  
MLTn = Multiple Logical Terminal Level 1, 2, or 3  
BASE = All except functions listed above

- Function Combinations that fit within 1Mb of Storage:

\* CSCU CC (DSK or FD)  
\* (BASE)  
\* (BASE) + MLT1  
\* (BASE) + MLT2  
\* (BASE) + CSCM NC (DSK or FD)  
\* (BASE) + CSCM CC (DSK only)  
\* (BASE) + MLT1 + CSCM NC (DSK or FD)  
\* (BASE) + MLT1 + CSCM CC (DSK only)  
\* (BASE) + AEA  
\* (BASE) + MLT1 + AEA

- Function Combinations that Require 1.5Mb of Storage:

\* (BASE) + MLT3  
\* (BASE) + CSCM CC (FD)  
\* (BASE) + MLT1 + CSCM CC (FD)  
\* (BASE) + MLT2 + CSCM NC (DSK or FD)  
\* (BASE) + MLT2 + CSCM CC (DSK or FD)  
\* (BASE) + MLT3 + CSCM NC (DSK or FD)  
\* (BASE) + MLT3 + CSCM CC (DSK only)  
\* (BASE) + MLT2 + AEA  
\* (BASE) + MLT3 + AEA  
\* (BASE) + AEA + CSCM NC (DSK or FD)  
\* (BASE) + AEA + CSCM CC (DSK or FD)  
\* (BASE) + MLT1 + AEA + CSCM NC (DSK or FD)  
\* (BASE) + MLT1 + AEA + CSCM CC (DSK or FD)  
\* (BASE) + MLT2 + AEA + CSCM NC (DSK or FD)  
\* (BASE) + MLT2 + AEA + CSCM CC (DSK or FD)

- Function Combinations that Require 2Mb of Storage:

\* CSCU CC + CDIS (DSK)  
\* (BASE) + MLT2 + CSCM CC (FD)  
\* (BASE) + MLT3 + CSCM CC (FD)  
\* (BASE) + MLT1 + AEA + CSCM CC (FD)  
\* (BASE) + MLT2 + AEA + CSCM CC (FD)  
\* (BASE) + MLT3 + AEA + CSCM NC (DSK or FD)  
\* (BASE) + MLT3 + AEA + CSCM CC (DSK or FD)

**512Kb Storage Expansion (#1011):** Provides an additional 512Kb of control storage for features, functions, and RPQs that use more than the 1.0Mb base storage. Maximum: Two (See "Limitations"). Limitations: Two card slots are provided for storage expansion. The

slots can be used for this feature or #1012, therefore the sum of #1011 and #1012 cannot exceed two. The 1.0Mb Storage Expansion feature #1012 should be considered, in lieu of this feature, to accommodate future functional growth and for the most efficient use of this available card slot.

**1.0Mb Storage Expansion (#1012):** (51R, 53R). Provides an additional 1,024Kb of control storage for features, functions and RPOs that use more than the 1.0Mb base storage. It is recommended to facilitate generating customized control diskettes for network 3174 Subsystem Control Units through the Central Site Customizing procedure. Maximum: One. Limitations: This feature cannot be installed on the Model 52R and some early production Models 51R. To determine if the feature can be installed, refer to the section of the 3174 Subsystem Control Unit User's Guide that describes the offline procedures. Select Online Test #2, Option #1. This feature cannot be installed on machines that show type number 9021 associated with hardware group (HG) 09.

**1.2Mb Diskette Drive (#1046):** Provides approximately 1.2Mb of additional diskette storage via a second diskette drive for high-capacity diskettes. This feature or the 20Mb Fixed Disk Drive feature (#1056) is a prerequisite to support the following features and functions of the 3174 subsystem: Asynchronous Emulation Adapter feature (#3020), attachment of any terminal that requires downstream load of microcode from the control unit (e.g., 3179-G), use of the Central Site Customizing procedure, use of the Merge Downstream Load procedure, and use of the Full Copy or Modify and Copy facilities of the Copy Files procedure. This feature is not required to support other procedures, but can enhance their usability and reduce the time required to execute many of them due to the reduction or elimination of diskette swapping on a single-drive control unit. Maximum: One. See "SUPPLIES" section for additional diskettes. Limitation: Cannot be installed with 20Mb Fixed Disk Drive (#1056).

**20Mb Fixed Disk Drive (#1056):** Provides 20Mb of file storage. It supports all the functions provided by the 1.2Mb diskette drives, including control unit microcode IML, microcode downstream load to terminals and features that require it, and full support of all utility procedures. This feature is not a prerequisite for the Central Site Customizing Utility or Central Site Change Management, but their usability is significantly improved when it is used. Maximum: One. Limitation: (1) Cannot be installed with 1.2Mb Diskette Drive (#1046) (2) 3174 Configuration Support-S microcode for the IBM Token-Ring Network 3270 Gateway does not support this feature.

**Asynchronous Emulation Adapter (#3020):** (51R, 52R) Provides an adapter with a microprocessor, storage and control logic, an I/O panel with eight EIA 232C connectors and a diskette containing the microcode for the adapter. (This microcode is the same that is provided on Auxiliary Microcode Diskette #9015, which should not be ordered when #3020 is ordered.) An ASCII terminal or host may be attached to each port using switched or non-switched (direct connect or dedicated line) transmission facilities. The adapter supports:

- ASCII Terminal Emulation - IBM 3270 displays can emulate an IBM 3101 or DEC VT100 display and IBM 3270 printers can emulate an ASCII printer for connection to ASCII hosts or public data networks.
- 3270 Terminal Emulation - ASCII displays can emulate an IBM 3178 Model C2 or 3279 Model 2A (four color display) and ASCII printers can emulate an IBM 3287 Model 2 for connection to an IBM host.
- ASCII Pass Through - ASCII displays and printers can connect to ASCII hosts or public data networks through the adapter.

The adapter supports full-duplex, character-mode, asynchronous transmission of seven-bit ASCII (ANSI 3.4,1977) data with parity. Odd, even, mark, space, and no-parity coding are supported. Each port provides an EIA 232C electrical interface and supports transmission speeds of 300, 600, 1200, 2400, 4800, 9600 and 19200 bps via modems over non-switched and switched communications facilities or via direct connection without modems. Transmit and receive speeds must be the same. Autobaud detect and XON/XOFF, DTR, and CTS asynchronous flow controls are supported.

Ports are configurable in any combination of ASCII Terminal Emulation, 3270 Terminal Emulation and ASCII Pass Through

ASCII Terminal Emulation for display terminals: 3270 CUT mode displays with a 1920 byte or larger buffer and 3270-PCs operating in CUT mode are supported for IBM 3101 and DEC VT100 display emulation.

(VT100 is a registered trademark of Digital Equipment Corporation.)

ASCII display emulation provides the following support:

- Full duplex character mode data transmission.
- 24 lines at 80 characters per line.
- Operator indicator line.
- Mapping of the 3270 display keyboard.
- Data stream mapping.
- Function keys.
- Typematic keys.
- ALT key (3101).
- Caps Lock key (VT100).
- CTRL key (VT100).
- Break key (long and short for VT100).
- ASCII display keyboard setup options that have equivalent 3270 keyboard setup functions.
- Specification by controller customization of terminal setup options which can be supported on the 3270 display.

The IBM 3101 functions and keys that are not supported are:

- Half-duplex transmission and functions associated with half-duplex operation.
- Block Mode and keys active in Block Mode.
- Reverse video
- Local mode
- Transparent mode
- Auxiliary printer port and associated keys.

The DEC VT100 functions and keys that are not supported are:

- Keys associated with setup mode which do not have equivalent 3270 keys.
- Interlace Mode
- Screen Mode (Reverse and Normal)
- Set Character Set
- Invoke Confidence Test
- Attached printer and Hard Copy key.

IBM typewriter, APL, and text keyboards are supported via specific keyboard maps for emulating the IBM 3101 or the DEC VT100. Keys that are not applicable to ASCII display emulation are not active.

See the IBM 3174 Subsystem Control Unit Asynchronous Emulation Adapter Introduction, GA23-0331, for more detailed information on supported keyboards and their mapping.

ASCII Terminal Emulation for printers: The IBM 3287 Models 1 and 2, 3262 Models 3 and 13, 3268 Model 2 and 4224 Models 201 and 202 are supported for ASCII printer emulation. ASCII control codes for the following functions are supported: line feed, form feed, carriage return, bell, and tab-skip to the next multiple of eight characters.

3270 Terminal Emulation for displays terminals: The following ASCII displays are supported for 3270 Terminal Emulation: IBM 3101, 3151 as a 3161 or 3162 depending on the model, 3161, 3162 and 3163, DEC VT52, VT100 and VT220 (emulating a VT100), TeleVideo 912 and 970, Lear Siegler ADM 3A, ADM 5, ADM 11, ADM 12 and 1178, ADDS Viewpoint A-2 and Viewpoint 78, Esprit-Hazeltine 1500 and Esprit 78 and Hewlett Packard 2621. The IBM 3164 is supported 3279 Model 2A emulation (four colors). The DEC VT241 operates in two colors only.

(TeleVideo is a registered trademark of TeleVideo Systems, Inc. ADM is a registered trademark of Lear Siegler, Inc. Viewpoint is a registered trademark of Applied Digital Systems, Inc. ESPRIT 78 is a trademark of Esprit Systems, Inc. Hazeltine is a trademark of Hazeltine Systems, Inc. Hewlett Packard is a registered trademark of Hewlett Packard.)

The user has the choice of a specific map designed for each ASCII display or a universal keyboard map. The ASCII display keyboards are not locked during a screen write. This enables keystrokes to be

entered while the screen is being updated for greater keying productivity.

An operator indicator status line is provided on the 25th line for the ASCII displays that provide an accessible 25th line. For the others, an escape sequence is provided to display the operator indicator information on the 24th line. The indicator line can be toggled on and off when the 24th line is used.

IBM Personal System/2 systems and IBM Personal Computers meeting the attachment requirements and using a program that emulates one of the supported displays will be supported for 3270 Terminal Emulation. Other personal computers using a program that emulates one of the supported displays and other displays meeting the attachment requirements and matching the keyboard map, the graphics codes and the control sequences for a supported display for cursor positioning, line erase, screen erase, terminal setup and reset, highlighting (if supported) and operator status line control (if supported) will be supported.

Non-IBM devices may be attached to this emulation adapter under the provisions of the IBM Multiple Supplier Systems Bulletin. It is the customer's responsibility to determine that the emulation program provides identical function and operation as the emulated supported display.

3270 Terminal Emulation for printers: The IBM 4201 Proprinter and Proprinter II, 4202 Proprinter XL, 4207 Proprinter X24 and 4208 Proprinter XL24 are supported for 3270 Terminal Emulation. The serial interface feature is required in order to attach to the Asynchronous Emulation Adapter.

Other ASCII printers that meet the attachment requirements and conform to the following characteristics will be supported for 3270 Terminal Emulation. Supports upper and lower case alphabetics or, if not, folds lower case to upper case. The printer must have a minimum of 80 print positions and should support the maximum line length sent by the application program. The following ANSI commands must be supported: Carriage Return (Control M, hex OD), Line Feed (Control H, hex OA), and Bell (Control G, hex O7). Carriage Return must not generate a Line Feed nor can a Line Feed generate a Carriage Return. The printer must not be dependent on any delay characters to allow for mechanical motion. Printers must use one of the flow control procedures supported by the adapter or be able to print at the full line speed.

ASCII Pass Through: This option provides the connection of an ASCII terminal to an ASCII host or network through the adapter. The 7-bit data character is unchanged. The adapter flow controls must be used. The terminal and host lines can use different transmission speeds, parity options, number of stop bits and flow controls.

Host Attachment: ASCII host attachment is via any port of any adapter on the same 3174 as the ASCII or 3270 terminals. IBM host attachment is via the host attachment interface of the 3174 in which the adapter is installed. A specific path can be specified through control unit customization or a Destination Menu is provided to enable the terminal operator to select the desired host attachment.

Switched line ports can be collected into pools to provide more efficient utilization of dial facilities. Access to an ASCII host or public data network can be provided dynamically through switched port selection when a request is received from a 3270 or ASCII display. ASCII display dial-in ports may be included in the switched port pools for increased utilization if desired.

Camp-on (restarting a connection request when a port becomes becomes available) is supported for access requests to the 3270 host.

Online Tests, Error Logs and Alerts: Online tests will be available at the controller to provide status and error information for the adapter. Errors that can arise during asynchronous device operation will be logged and ALERTS generated in the same fashion as for 3270 devices.

Modems: In general, all leased line, limited distance and switched line modems that provide full duplex asynchronous transmission, support equal transmit and receive speeds and conform to EIA 232C specification on the pins shown below should operate satisfactorily.

- 1 - GND - Frame Ground
- 2 - TD - Transmit Data
- 3 - RD - Receive Data
- 4 - RTS - Request to Send
- 5 - CTS - Clear to Send (optional)
- 6 - DSR - Data Set Ready
- 7 - SG - Signal Ground
- 8 - CD - Carrier Detect
- 20 - DTR - Data Terminal Ready
- 22 - RI - Ring Indicate
- 25 - BSY - Busy Out (optional)

The IBM 5841 and 5842, the Hayes 300 and 1200 and the Micom 3012 and 3024 intelligent modems are supported for autodial to ASCII hosts via CBXs, PBXs and the public switched network. The dial strings may be stored in the 3174 at customization or entered from the 3270 or ASCII display keyboard.

The IBM 5841 cannot be used in switched port pools described in the "Host Attachment" section.

Other intelligent modems that use the "AT" or the Micom command set and meet the preceding requirements will also be supported for autodial. Non-IBM modems may be attached to this emulation adapter under the provisions of the IBM Multiple Supplier Systems Bulletin.

Manual dial from a 3270 or ASCII display keyboard is supported for modems which accept dial commands as sequences of ASCII codes over the data leads and which return responses through the data leads. No lead changes are permitted during dialing.

Security: The Asynchronous Emulation Adapter provides password protection for access from ASCII displays via switched line ports. In addition, the adapter provides features that can be used with host application systems and programs to implement security and control functions at the host.

User management is responsible for evaluation, selection and implementation of security features, administrative procedures and appropriate controls in application systems and communication facilities.

Maximum: One. Prerequisite/Corequisite: (1) 1.2Mb Diskette Drive or 20Mb Fixed Disk optional feature (#1046 or 1056), and (2) Base configuration support microcode released in conjunction with this feature. Performance Considerations: Response times when this feature is used will depend on many variables including the number and types of terminals attached, the transaction rates and contents, and system parameters such as RU lengths, pacing, etc. "Performance Guidelines for IBM 3X74 Attached Workstations", ZZZ0-4167, will be updated to include Asynchronous Emulation Adapter information.

**IBM Token-Ring Network 3270 Gateway (#3025) Release 2.0:** (51R, 52R) Provides for data passage between an IBM host and Token-Ring Network. It includes an adapter, a 2.4m (8 ft) communications cable, a Utility/Diagnostic diskette, and a configuration support control diskette with microcode needed to connect and manage an IBM Token-Ring Network downstream of the control unit. This feature provides the capability of up to 140 defined Token-Ring attached devices, as PU 2.0 nodes, to communicate with an IBM host. Any combination of the following Token-Ring attached devices are supported by this feature:

- IBM 3174 Models 3R or 53R
- IBM PC using IBM PC Emulation Program Version 3
- IBM PC using APPC/PC (as a PU 2.0 node)
- IBM System/36 with the LAN Attachment Feature, and using 3270 emulation or APPC (as a PU 2.0 node)
- IBM PC using IBM Operating System/2 Extended Edition Version 1.1
- IBM PC or 3270 PC using IBM 3270 Workstation Program Version 1.1

The number of SNA logical units supported by each PU and the protocols used by these LUs are transparent to this feature. Each PU 2.0 attached to the Token-Ring appears to the host as an SDLC multidropped 3270 SNA Control Unit. 3174 Models 3R and 53R attached to the Token-Ring can attach up to 32 and 16 workstations, respectively.

This capability is available on Models 51R and 52R using SNA/SDLC protocol in data half-duplex point-to-point or multipoint modes on duplex or half-duplex non-switched facilities. SNA/X.25 protocol is not supported. The remote gateway can attach to a 308X, 3090, 4361/4381 or 9370 via an IBM 3270 or 3725 Communications Controller. The 3174 can also attach to the 4361 via its Communication Adapter or to the 9370 via the Telecommunications Subsystem Controller.

The number of devices using this capability is dependent on available 3174 storage and end user response time requirements. The performance of the remote gateway is affected by the polling overhead of the SDLC multidrop implementation; factors affecting performance are line speed, distance from the Communications Controller or Adapter, application transaction characteristics, and the number of PUs being polled.

Except for response time considerations, this feature does not affect the operation of the displays, printers, or workstations directly attached to the 3174 Models 51R or 52R.

Maximum: One. Prerequisites/Corequisites: At least one Storage Expansion feature (#1011 or #1012). The amount of storage expansion is determined by the number of SNA PUs on the Token-Ring that are defined to the ACF/VTAM for host sessions. The maximum number of PUs that can be defined is 140. Storage Requirements:

- Up to 72 PUs: One #1011 (Minimum required)
- Up to 140 PUs: One #1012 (Maximum supported)

Note: Feature #1012 is not available on the Model 52R or some early production Models 51R.

Limitations: (1) Configuration Support-A, Release 1 will not operate in a machine that has the Token-Ring adapter associated with this feature installed. Release 2, or higher, is required. The Gateway function is not available when Configuration Support-A is loaded. (2) 3174 Configuration Support-S Release 2, which is shipped with this feature and provides the gateway function, contains all the applicable functions of the 3174 Configuration Support-A, Release 2. The enhancements announced for Release 3 are not provided. Release 2.1 of Configuration Support-S adds the Central Site Customizing Utility procedure. (3) The Configuration Support-S microcode which is shipped with this feature does not support the 20Mb Fixed Disk Drive, Multiple Logical Terminal, or Central Site Change Management functions. (4)

Performance considerations: For performance reasons, a customer may elect to limit the number of SNA PUs that concurrently pass traffic through the gateway to a number less than the number shown above. Consult "Performance Guidelines for IBM 3X74 Attached Workstations" (ZZ20-4167), or use the HONE AID FIVE3270 to evaluate the actual performance to be expected in a desired configuration and user application/host environment.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

Accessories can be ordered from country Direct Marketing Centers or other responsible supplies marketing group.

**Communication Cables:** A communication cable connects the 3174 to a modem or other data circuit-terminating equipment (DCE). Accessory communication cables for the EIA RS-232/CCITT V.24 and CCITT V.35 electrical interfaces are available for 3174 Model 51R; accessory communication cables for the CCITT X.21 electrical interface are available for the 3174 Model 52R. Cables in 6m (20 ft) and 12m (40 ft) lengths are available. Order both the cable (by part number), and the "3174 Model and Interface Conversion Customer Setup Instructions" (by publication order number).

- Cable, RS-232/V.24, 6m (20 ft) - P/N 6423153
- Cable, V.35, 6m (20 ft) - P/N 6423325
- Cable, X.21, 6m (20 ft) - P/N 6168155
- Cable, RS-232/V.24, 12m (40 ft) - P/N 6423154
- Cable, V.35, 12m (40 ft) - P/N 6423327

- Cable, X.21, 12m (40 ft) - P/N 6168156
- CSU Instructions, Canadian/French - GA09-0371
- CSU Instructions, English - GA23-0295
- CSU Instructions, French - GA11-0509
- CSU Instructions, Spanish - GA10-8843
- CSU Instructions, Japanese - N: GA23-0295

**Charges:** For local charges, consult your IBM marketing representative.

**IBM 3270 DPC-T3 Adapter (P/N 83X9758):** A cable adapter assembly that permits direct attachment to telephone twisted pair wire, that meets the IBM Cabling System Type 3 specifications, up to a maximum distance of 275m (900 ft.). It is 4.6m (15 ft.) in length with an IBM Dual Purpose Connector (DPC) at one end and a miniature six-pin modular telephone connector on the other end. The telephone connector can be cut off, and the wire inserted directly into telephone punch-down blocks that are capable of accepting stranded telephone wire. The accessory can also be used at the terminal end of the wire provided the terminal has an IBM Dual Purpose Connector (DPC). (Canada only) Otherwise, a CTPA is required. <

**Ordering:** Order via NDD DRO or via Distributors authorized to market the IBM Cabling System components. Minimum order quantity is one package which contains ten IBM 3270 DPC-T3 Adapter assemblies.

## MACHINE ELEMENTS (NONE)

## SUPPLIES

None required with the machine order.

Supplies can be ordered from country Direct Marketing Centers or other responsible supplies marketing group.

**Diskettes (P/N 6109660):** Provides a slipcase (SC) containing ten blank 5-1/4 inch diskettes with 1.2Mb of usable capacity for 3174 Diskette Drives.

**IBM 3174 Diskette Identification Labels (GX23-0389):** Provides five labels to uniquely identify diskettes used with the 3174.

**Diskette Mailer (P/N 2656102):** Provides one diskette mailing container.

**X.21/X.25 Keyboard Labels:** Provides 12 sets of seven keyboard stick-on labels (on one sheet) for X.21 switched network or X.25 network operation via a 3174 Model 51R or 52R. Order both the labels (by part number), and installation instructions (by publication order number).

- Sheet of Labels - P/N 1743595
- Instructions, English - G126-0158
- Instructions, Canadian/French - G509-2504

**Charges:** For local charges, consult your IBM marketing representative.

## CABLING INFORMATION

**Coaxial Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "Installation and Assembly of Coaxial Cable and Accessories" for Attachment to IBM Products, GA27-2805.

**IBM Cabling System:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System Planning and Installation Guide", GA27-3361.

**(Canada only) Twisted Pair Telephone Wire:** For proper identification, installation, and application of cable, refer to "IBM/Rolm Plan-

ning and Installation Guide for 3270 Coax to Twisted Pair Adapter",  
GA27-3722. <)

## 3174 SUBSYSTEM CONTROL UNIT MODELS 81R, 82R

### PURPOSE

3174 Subsystem Control Unit models for remote attachment of very small clusters of 3270 Information Display System displays, printers, and workstations to IBM host processors via telecommunication links. Up to four non-downstream load (DSL) terminals can attach to each basic model, up to eight non-DSL terminals can attach when a 3299 Terminal Multiplexer is used, and up to seven non-DSL terminals can attach when a 5209 3270-5250 Link Protocol Converter is used.

### MODELS 81R, 82R

**Model 81R:** Provides EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for remote link attachment. Supports binary synchronous (BSC) communication up to 9.6K bps, SNA/X.25 communication up to 19.2K bps, and SNA/SDLC communication up to 64K bps.

**Model 82R:** Provides a CCITT X.21 interface for remote link attachment. Supports SNA/X.25 communication up to 19.2K bps and SNA/SDLC communication up to 64K bps.

#### Prerequisites:

- A control unit terminal (CUT) or 3270 PC operating in CUT mode attached to port 0 is required to customize subsystem microcode or to run offline diagnostics from a display.
- A CUT or 3270 PC operating in CUT mode attached to any port is required to perform subsystem RAS tests.
- A CUT or 3270 PC operating in CUT mode attached to any port is required to establish X.21 switched network and X.25 sessions. After session establishment, all terminals, CUT and DFT, can use the established session.

**Customer Setup (CSU):** All models are designated as customer setup. This offers the customer early availability and relocation flexibility. Setup procedures for the customer are shipped with each machine as part of the "User's Guide". A clear indication that the machine is operational is given.

### HIGHLIGHTS

The 3174 Models 81R and 82R are non-programmable subsystem control units for remote attachment of 3270 Information Display System displays, printers, and workstations to IBM host processors via telecommunication links. The 3174 runs under control of an integrated microprocessor and associated control program, which can be customized by the user to meet specific requirements.

Units are shipped with a host-attachment interface, 1.0Mb of control storage, a 1.2Mb diskette drive, and a four-port terminal adapter to attach supported devices (see "Terminal Attachment") either directly (four terminals), or via a 3299 Terminal Multiplexer (eight terminals), or via a 5209 3270-5250 Link Protocol Converter (seven terminals). The Model 81R provides both EIA RS-232-C (CCITT V.24) and CCITT V.35 electrical interfaces. The desired interface is enabled during initial microcode load of the control unit, based on the type of communication cable (RS-232-C or V.35) that is attached. The Model 82R provides a CCITT X.21 interface. A 6m (20 ft) communication cable is shipped with each unit. (See "Basic Configuration" and "Specify" for communication cable options.) All units are shipped with a 4.3m (14 ft) power cord with appropriate plug, and Configuration Support-A microcode (two Control diskettes, and one Utility/Diagnostic diskette).

#### Product characteristics include:

- Hardware Characteristics:
  - CMOS technology, VLSI circuitry, and surface mount devices (SMD) for high RAS characteristics, low power consumption, and a very small footprint.

- 1.0Mb control storage (IBM million-bit technology) to accommodate the control program and microcode-selectable functions.
- 5.25-inch, high-capacity (1.2Mb) diskette drive.
- Direct attachment to IBM Cabling System types 1, 2, and 9 media for terminal connections (A balun cable assembly is not required).
- Response time monitor.
- TP link speeds up to 64K bps.
- Mountable in an industry standard rack or on a table top.
- No special feature options.
- Accommodation for up to 10 microcode RPQs per control unit.

- Microcode Function Base. 3174 Configuration Support-A, Release 2 was the original microcode function base for these models. Configuration Support-A is the same microcode that is used by all other 3174 models. The original microcode function base was equivalent to 3274 Configuration Support-D, except for the following functions that are not supported on these models:

- 3278 Model 1 displays (960-character buffer) and use of the 960-character buffer format by printers.
- (Canada Only) 3278/3279 PC Attachment features (#5315, #5316/#5325, #5326) <

The following 3174 Configuration Support-A, Release 2 functions that are applicable to other 3174 teleprocessing control unit models and require features not available on the Models 81R and 82R are not supported:

- Downstream load of microcode to attached terminals.
- Merge Downstream Load utility procedure.
- Full Copy and Modify and Copy routines of the Copy Files utility procedure.
- Central Site Customization utility procedure.
- RPQ functions that use more than 1.0Mb control storage (See RPQ Description Price Transmittals for RPQ storage requirements.)

- Configuration Support-A, Release 3 Functions. A subset of the functions provided in 3174 Configuration Support-A, Release 3 microcode apply to these models.

- Multiple Logical Terminals (MLT) support for interaction with up to five host sessions in base microcode. Three levels of MLT support are selectable at customization: MLT Level 0 allows no MLT; MLT Levels 1 and 2 reserve specific amounts of storage which allow various combinations of displays and session counts to be defined. (Refer to Customization documentation.) (Due to the storage limitation of these models, MLT Level 2 cannot co-exist with Central Site Change Management.)
- Central Site Change Management. These models can non-disruptively receive new customization parameters that are distributed electronically through the communications network from a central site that uses the facilities of the appropriate releases of Distributed Systems Executive (DSX) and ACF/VTAM. (Due to the storage limitation of these models, this function cannot co-exist with Multiple Logical Terminals Level 2.)

- Reliability and Availability Characteristics:

- Built-in microcode and hardware error recovery.
- Self-identifying communication cable and logic circuitry at both IML and control unit diagnostic operation.
- Uninterrupted IML for non-critical conditions. Complements host-initiated IML under Central Site Change Management.
- Continued control unit operation by unaffected portions during faults in the Terminal Adapter.
- Hardware error correction code for storage.
- Dynamic storage reconfiguration.
- Few field-replaceable units (FRUs).

- Serviceability Characteristics:

- Self-configuring offline diagnostics, with automatic or manual selection of routines.
- FRU call-out at operator's panel and/or display terminal.
- Error status codes reported on four 7-segment light-emitting diodes (LED).

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- Errors time-stamped and logged to the diskette.
- Extensive Alerts, including identification of failing components, specifics of Bind failures, and specifics of failing data streams.
- Device attachment media threshold Alerts.
- Logging of executing task and microprocessor priority level upon control unit failures.
- Terminal interface driver/receiver wrap capability.
- Customization Characteristics:
  - Use of words and phrases on the customization panels.
  - Error messages presented on screen.
  - Optional selection of Printer Authorization Matrix definition panel, with self-explanatory prompts.
  - Few configuration questions for 3274-equivalent function.
  - Extensive use of defaults.
  - Short machine execution time.
  - Same operational procedures as on larger 3174 models without the optional 1.2Mb Diskette Drive feature.
  - Use of full screen with a CUT-mode terminal Model 3 or 4, rather than presentation in a Model 2 format.
  - Electronic receipt of customization parameters and/or data via the Central Site Change Management function at the host site. (Due to the storage limitation of these models, this function cannot co-exist with Multiple Logical Terminals Level 2.)
- Usability Characteristics:
  - Operator's panel with four seven-segment light-emitting diode (LED) readouts.
  - User-friendly problem determination tools, including self-configuring diagnostics, extensive use of program function keys, and formatted displays of configuration data.
  - Multi-purpose teleprocessing adapters that provide variable operating speeds, host attachment interfaces, and protocol support.
- Offline Procedures: 3174-based offline utility procedures to aid in configuring and managing of 3174 microcode and to provide offline diagnostic functions are provided on a Utility/Diagnostic diskette. The procedures are invoked from a "Master Menu" panel that is displayed on a Control Unit Terminal (CUT) attached to port 0. The procedures are provided on a Utility/Diagnostic diskette that is shipped with each machine. The 3174 offline procedures that are applicable to Models 81R and 82R include:
  - Customize the Control Diskette. Provides facilities to configure control unit microcode, define printer authorization matrix, merge RPQs, and modify keyboards.
  - Copy Files. Five variations of this procedure provide the means to copy configuration data, Printer Authorization Matrix, Patches, RPQs, and modified keyboard definitions from one Control diskette to another. The "Full Copy" and "Modify and Copy" facilities of this procedure, which require two diskette drives, are not applicable to Models 81R and 82R.
  - Microcode Upgrade. Provides a process to update a newly released control diskette with the configuration data from a down-level control diskette, thus reducing the time required to execute this task.
  - Identify Customizing Keyboard. Expands the types and configurations of keyboards from which the 3174 customization process can be executed.
  - Diagnostics. Provides a full range of offline diagnostics. They are selected from a menu panel displayed on the port-0 CUT-mode terminal when this procedure is invoked.

### Customer Responsibilities:

1. Adequate site, system, and other vendor preparation.
2. Price quotations, installation, and costs (initial and recurring) of common carrier equipment and service.
3. Receipt at the customer's receiving dock, unpacking, and placement of the unit.

4. Physical setup, connection of cables to communication lines/modems and IBM customer setup (CSU) devices, and check out.
5. Contacting CE to make 3174 cable connections to non-CSU IBM units.
6. Performing customization in accordance with IBM-supplied procedures:
  - For initial setup.
  - When made necessary by changes in configuration.
  - For updating control unit diskettes (at customer option).
  - When initializing and updating the keyboard tables using the Keyboard Definition facility of the customization procedure.
7. Using the problem determination procedures provided with the unit prior to calling IBM for service.
8. Following instructions provided by IBM regarding relocation.

**Publications:** See KWIC Index, G320-1621, or applicable system bibliography.

- 3270 - GA23-0058
- 4300 - GC20-0001
- 8100 - GC20-8100

HONE: Use the HONE configurator (CF3270) to assist in configuring the 3174 before entering an order.

## TERMINAL ATTACHMENT

All 3174 models use the same terminal attachment interface architectures; they are the same as used by the 3274. Documentation describing the interface between 3X74 control units and their attached IBM devices is available.

The IBM displays, printers, 3270 PCs, and IBM PCs (and associated emulation software) supported for attachment to Models 81R and 82R are listed below. Products and software not specifically listed should be tested by the customer to verify correct operation. Continued improvements in the 3174 and attaching terminals may require microcode or hardware updates to the attaching products. Consult RETAIN for information on product compatibility.

Up to four terminals can attach to 3174 Models 81R or 82R via the terminal adapter ports provided, up to eight can attach via a 3299 Terminal Multiplexer, or up to seven can attach via a 5209 3270-5250 Link Protocol Converter. Using a 5209 provides the additional benefit of allowing terminals to attach to both a 3174 and a System/36-38. See M5209 pages for details of attachment.

Either RG-62A/U coaxial cable, IBM Cabling System media (Canada, Australia, Japan only) or specified telephone twisted-pair wire (IBM Cabling System Type 3 media) can be used for connections to the 3174. Depending on the type of wire used, the distance between the 3174 and its attached terminals can be up to 1,500m (4,920 ft); when a 3299 is used, the maximum distance can be up to 3,000m (9,840 ft). The 3174 ports are Dual Purpose Connectors (DPC), which do not require a balun cable assembly to connect terminals via IBM Cabling System Types 1, 2, or 9 media, but some terminals may. (Refer to the appropriate terminal pages.) Using a balun assembly reduces the maximum allowable wire lengths as shown below.

### 3174 Terminal Attachment Maximum Wire Lengths:

Number of Baluns	RG-62A/U Coaxial Cable		IBM CABLING SYSTEM MEDIA			
	Cable		Types 1 & 2		Type 9	
	m	ft	m	ft	m	ft
0	1500	4920	1500	4920	1000	3280

| 1 | N/A | N/A | 1000 | 3280 | 667 | 2186 |

(Canada > IBM Cabling System Type 3 Media (specified telephone twisted-pair wire) can also be used for connections to the 3174. Connection to the telephone twisted-pair can be via an IBM/ROLM Coax to Twisted-Pair Adapter (CTPA), or equivalent. When one end of the telephone twisted-pair is attached to a CTPA, the maximum length is 275m (900 ft). <)

## Display and Printer Attachment

The following displays and printers are supported for attachment to the 3174. (See Note 1.) The Type-Model(S) (prerequisites) Names are:

- \*3178-C1,C2, C3, C4 Display Station
- \*3179-1 Color Display Station
- 3180-1 Display Station
- \*3191-A1X, B1X, D1X, E1X, L1X, A2X, B2X, D2X, E2X, L2X, A3X, B3X, D3X, E3X, L3X Display Station
- \*3192-C1X, F1X, C2X, C3X, F2X, F3X Color Display Station
- \*3192-D1X, L1X, D2X, D3X, L1X, L2X, L3X Display Station
- \*3194-C10, C20, D10, H20, H20., H50 Display Terminal
- 3262-3, 13-Line Printer
- 3268-2 Printer
- 3268-2C Color Printer
- \*3278-2, 3, 4, 5 Display Station
- \*3279-S2A, S2B, S3G, 2X, 3X Color Display Station
- 3287-1, 2 (#8331) Printer
- 3287-1C, 2C Printer
- 3812-2 (#3190) Pageprinter
- 3814-A1, A2, A3, A4 (#1440) Switching Management System
- 4224-201, 202, 2E2, 2C2 Printer
- 4234-1 Dot Band Printer
- 4245-D12, D20 (Note 2) Line Printer
- 4250-1 (Notes 2, 3) Printer
- 4250-2 (Notes 2, 3) 4250 II ElectroCompositor
- 5210-G1, G2 Printer
- (APG Only > 5227-11 Printer
- 5578 (Note 4) Japanese Workstation <)

\* Control unit terminal (CUT) or terminal that can operate in CUT mode and be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions.

## Notes:

1. 3278 Model 1 displays (960-character buffer) and the "960-Character Print Operation" option that is available on some printers are not supported.
2. The high data volumes possible with this device may not be realized because of host TP communication facility limitations. It is strongly recommended that the "Performance Guidelines for IBM 3X74 Attached Workstations", ZZ20-4167, be consulted to determine what performance may be expected.
3. Requires 4250 RPQ 7B0980.
4. (APG Only > This terminal can operate in CUT mode and be used for customization. <)

## Personal Computer Attachment

**IBM 3270 Personal Computers:** The IBM 3270 PCs supported for attachment are listed below. Current host communications programs that support a 3270 PC attached to a 3274 will work unchanged with a 3270 PC attached to a 3174. Any 3270 PC operating in CUT mode can be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions.

Type-Model(s)	Name
5271 All	3270 PC
5273 All	3270 PC AT
5371 All	3270 PC/G, GX
5373 All	3270 PC AT/G, AT/GX

**IBM Personal Computers:** The following IBM PCs are supported for attachment when emulating the functions of a 3278 Display Station

Model 2 or a 3279 Color Display Station Model 2A or S2A through the software listed below. IBM PCs operating in CUT mode(APG Only >, except for the 5550 family, <) can be used for customization, running 3174 offline diagnostics, performing RAS tests, and/or establishing X.21/X.25 sessions. The Type/Model(s) (Prerequisite) Names are:

- 5150 All (#5050) Personal Computer
- 5160-068, 078, 086, 087, 088, 089, 267, 268, 277, 278 (#2507 or #5050) Personal Computer XT
- 5162-286 Personal Computer XT
- 5170-068, 099, 239, 319, 339 (#2507 or #5050) Personal Computer AT
- 5170-599, 739, 919, 939 Personal Computer AT/370
- (APG Only > 5540/5550/5560 System (Note) 5550 Family (as 3270) <)
- 6150-20, 25, A25 RT Personal Computer
- 6151-10, 15 RT Personal Computer
- 8530-021 (#5050) Personal System/2 Model 30
- 8550-021 (#2000) Personal System/2 Model 50
- 8560-041, 071 (#2000) Personal System/2 Model 60
- 8580-041, 071 (#2000) Personal System/2 Model 80
- 9370 Processor Console

**Note:** (APG Only > Can operate in CUT mode and be used for customization; requires 3174 RPQ 8K1349, which is shipped with each machine in Japan, for 5550 printer sharing. <)

**IBM PC 3278/79 Emulation and File Transfer Software:** The IBM PCs listed above are supported for attachment when configured to operate with:

- IBM Personal Computer 3278/79 Emulation Control Program Version 2 (P/N 8665780)
- IBM PC 3270 Emulation Program, Entry Level (P/N 59X9904)
- IBM PC 3270 Emulation Program Version 3 (P/N 59X9969)
- 3270 Workstation Program Version 1.0 (P/N 74X9921) and Version 1.1 (P/N 75X1088)
- RT PC 3278/79 Emulation Program (PP 5669-052)
- Virtual Machine/Personal Computer Release 2 (P/N 6467040)
- Personal Services/PC Release 1.04 (P/N 6403826, or higher)
- VM Bond Release 2 (P/N 6467022)

**IBM PC Host File Transfer Software:** The 3174 supports the following host file transfer programs that allow the IBM PCs listed above to perform file transfers. Refer to the appropriate product documentation for details on the supported configurations.

- PC Bond (PP 5664-298)
- Virtual Machine/Personal Computer Release 2 (PP 5664-319)
- MVS/TSO (PP 5665-311)
- VM/SP (PP 5664-281)
- DISOSS - for MVS (PP 5665-290)
- DISOSS - for VSE (PP 5666-270)
- PROFS Version 2 (PP 5664-309) (Personal Computer Connection Extended)

## SYSTEM ATTACHMENT

**Processors:** The 3174 communicates with the following IBM systems and processors using SNA and non-SNA protocols:

## System/Processor Communication Table:

SYSTEM/ PROCESSOR	Model 81R			Model 82R		
	BSC	SNA/ SDLC	SNA/ X.25	SNA/ SDLC	SNA/ X.25	
S/1	X	X	-	X	-	
S/36	-	X	X	X	X	
S/38	-	X	X	X	X	
S/88	X	X	-	X	-	
308X	X	X	X	X	X	
3090	X	X	X	X	X	
4361	X	X	X	X	X	

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4381	X	X	X	X	X
8100/DPPX	-	X	X	X	X
937X	X	X	X	X	X

Other system/processor attachments may be supported by RPQ, as appropriate. Use the HONE/INFO RPQ application to review for any additional supported systems. Use a search argument of "3174".

**Remote Link Attachment:** 3174 Models 81R and 82R can communicate with a 308X, 3090, 4361/4381, or 937X via a 3720 or 3725 Communications Controller. Communication with S/1, S/36, S/38, S/88, and 8100 (DPPX only) is via features in those products; communication with the 4361 and 937X may also be via communications features in those processors. Refer to the specific product Machines pages for details. A modem or other data circuit-terminating equipment (DCE) is required, unless the host processor or system provides a method of direct-connection attachment, without the need for a DCE. The Model 81R can also communicate via the 3710 Network Controller.

**Communications Facilities:** 3174 Models 81R and 82R operate in data half-duplex point-to-point or multipoint modes on duplex or half-duplex nonswitched facilities, and in half-duplex point-to-point mode on switched facilities as listed below. Operation on switched network facilities is supported only through SNA/SDLC. See the M2700 pages for specific country networks that are supported.

### Communications Facilities Table:

3174 MOD- EL	ELECTRICAL INTERFACE	FAC. See M2700 PGS	LINK/ NETWORK PROTOCOL	MAX. SPEED (bps)
81R	EIA RS-232-C/ CCITT V.24/28 (External clocking re- quired.)	D,G	BSC	9.6K
		C,D, E,G	SNA/SDLC	19.2K
			SNA/SDLC X.21bis)	19.2K
		K M		
	CCITT V.35 (External clocking re- quired.)	P,	X.25 X.21bis)	19.2K
		D,G	BSC	9.6K
		D,E, G	SNA/SDLC	64K
82R	CCITT X.21	M	SNA/SDLC X.21bis)	64K
		P	X.25 X.21bis)	19.2K
		L	SNA/SDLC	48K
		N	SNA/SDLC	64K
		Q	X.25	19.2K

**Modems:** IBM modems to which the 3174 Model 81R can attach include:

#### Nonswitched Modems:

3833	2400 bps
3834	4800 bps
3863-1	2400 bps
3864-1	4800 bps

3865	9600 bps
3868-1	2400 bps
3868-2	4800 bps
3868-3	9600 bps
3868-4	9600 bps
5811	2.4/4.8/9.6/19.2K bps (Baseband)
5865	9600 bps
5866	14400 bps
5868	9600 bps
5868	14400 bps

Switched network backup (SNBU) mode of operation is possible using an appropriately-featured external modem.

#### Switched Network Backup Modems:

3863	2400 bps
3864	4800 bps
3865	9600 bps
5865	9600 bps
5866	14400 bps

#### Switched Network Modems (SNA/SDLC only):

3863-2	2400 bps
3864-2	4800 bps

**PTT-Mandatory DCEs:** The 3174 Model 81R attaches to PTT-mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110, and relevant CCITT Recommendations for data transmission speeds. The Model 81R also attaches to PTT-mandatory DCEs meeting CCITT Recommendation V.35 and ISO standard 2593.

**Non-IBM DCEs:** Non-IBM DCEs complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35, or X.21 may be attached under provisions of the IBM Multiple Supplier Systems Bulletin.

**Public Data Networks:** Models 81R and 82R attach to X.21 switched, X.21 nonswitched, and X.25 Public Data Networks as listed in M2700 Charts K, L, M, N, P, and Q. 12 sets of seven keyboard stick-on labels (on one sheet) are provided with every 3174 Model 81R and 82R to facilitate X.21 switched network and X.25 session setup and termination.

**3710 Network Controller:** The Model 81R can attach to the 3710 Network Controller as indicated in the chart below. The maximum total cable length permitted between the 3174 and the 3710 is 15m (50 ft).

#### 3710 Attachment Table:

3710 Feature Number	Speed (K bps)	B S S D C L C	3174 Model 81R Interface
#7001	2.4/3.6/4.8/ 7.2/9.6 14.4/19.2	X X - - - X	RS-232-C (V.24/28)
#7005	2.4/3.6/4.8 7.2/9.6 14.4/19.2/ 48/56/64	X X - - - X	CCITT V.35

**Direct-Connection Attachment:** The 3174 can communicate with IBM hosts without the need for modems or other data circuit-terminating equipment. This method of "direct-connection" attachment is made through the 3174 EIA RS-232-C (CCITT V.24/V.28), CCITT X.21, or CCITT V.35 interface, via appropriate connecting cables, to the

direct-connection product's interface. The direct-connection product must provide bit clocking to the 3174.

Products that support direct-connection attachment of the 3174 are listed below. Only the interface features needed by the direct-connection products are listed; they may have prerequisites, therefore the "Machines" pages for those products should be reviewed.

The maximum, total cable length allowed between the 3174 interface and the host product interface is 122m (400 ft), unless the host product imposes a shorter limit. The physical planning manuals for those products can provide cabling data and other information necessary for direct-connection attachment.

Direct-Connection Attachment Table:

HOST PROD.	HOST FEATURE	SPEED (K bps)	B S C	D I C	3174 MODEL/ INTER- FACE
3720/ 3721	#4911 (LIC-1)	2.4/4.8/9.6 19.2	X	X	81R/ V.24
	#4931 (LIC-3)	2.4/4.8/9.6 19.2/38.4/56	X	X	81R/ V.35
	#4941 (LIC-4A)	2.4/4.8/9.6	-	X	82R/ X.21
	#4942 (LIC-4B)	2.4/4.8/9.6/ 19.2/38.4/56	-	X	82R/ X.21
3725/ 3626	#4911 (LIC-1)	2.4/4.8/9.6 19.2	X	X	81R/ V.24
	#4931 (LIC-3)	2.4/4.8/9.6 19.2/56	X	X	81R/ V.35
	#4941 (LIC-4A)	2.4/4.8/9.6	-	X	82R/ X.21
	#4942 (LIC-4B)	2.4/4.8/9.6/ 19.2/56	-	X	82R/ X.21
4361	#4801	2.4/4.8/9.6	X	X	81R/ V.24
8101, 8130, 8140 Mod- els A & B	#3701 (FACs 15-16)	2.4/4.8/9.6	-	X	81R/ V.24
	#1550 (FACs 24-26)	2.4/4.8/9.6/ 56	-	X	81R/ V.35
8140 Model C	#1621	4.8	-	X	81R/ V.24
	#1614	56	-	X	81R/ V.35
8150	#1733 or #1734	4.8/9.6	-	X	81R/ V.24
	#1742 or #1745	56	-	X	81R/ V.3

9370	#6031	2.4/4.8/9.6	X	X	81R/ V.24
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## BASIC CONFIGURATION

The machine is shipped as follows if only mandatory specify codes are selected:

- Communication Cable: (Model 81R) For the EIA RS-232-C/CCITT V.24 Electrical Interface.
- Power (AC, 50/60 Hz, 1-phase):
  - Argentina - 200-240V
  - Australia - 200-240V
  - Brazil - 100-127V
  - Canada - 100-127V
  - Chile - 200-240V
  - Japan - 100-127V
  - Mexico - 100-127V
  - New Zealand - 200-240V
  - Venezuela - 100-127V
  - All Others - (Must specify desired power)
- (Except Canada, Mexico, Nicaragua, Japan > Power Cord Plug. Determined by the 3-digit DPMO WT country code. The plug most commonly used in the country is shipped.<)
- (Canada, Mexico, Nicaragua Only > Power Cord Plug. A non-locking plug is shipped.<)
- (Japan only > Power Cord Plug. A locking plug is shipped.
- RPQ 8K1349. This RPQ for 5550 printer sharing is shipped with each machine.<)
- Machine Nomenclature: The country code is used to select the language of the nomenclature provided on the operator and power control panels, based on the language most commonly used in that country. The following languages are available:
  - English
  - French
  - Japanese
  - Portuguese
  - Spanish

## SPECIFY

- Specify #2998 (mandatory specify).

The remainder of the "Specify" section can be ignored if the options described in the "Basic Configuration" section are satisfactory. These specify features are shipped in lieu of the corresponding item(s) described above. Unless indicated otherwise, they are available only at the time of manufacture.

- Communication Cable (Model 81R). Specify #9000 for CCITT V.35 Electrical Interface Cable. (This code causes a CCITT V.35 cable to be shipped instead of an EIA RS-232/CCITT V.24 cable.)
- (Except Canada > Power (AC, 50/60 Hz, 1-Phase). Specify one of the following:
  - 100-127V: #0802
  - 200-240V: #0801<)
- (Canada, Nicaragua Only > Power Cord Plug. Specify #9890 for locking plug.<)
- (Mexico Only > Power Cord Plug. Specify #9890 for locking plug.
  - Prerequisite: 200-240V Power (#0801).<)
- (Japan only > Power Cord Plug. Specify #9891 for non-locking plug.
  - Limitation: Cannot be installed with 200-240V Power (#0801).<)
- Machine Nomenclature. Specify one of the following:
  - English - #2924
  - French - #2928
  - Japanese - #2930
  - Portuguese - #2933
  - Spanish - #2931

**MACHINES****SPECIAL FEATURES (NONE)****MODEL CONVERSIONS (NONE)****ACCESSORIES**

Accessories can be ordered from country Direct Marketing Centers or other responsible supplies marketing group.

**Communication Cables:** A communication cable connects the 3174 to a modem or other data circuit-terminating equipment (DCE). Accessory communication cables for the EIA RS-232/CCITT V.24 and CCITT V.35 electrical interfaces are available for 3174 Model 81R; accessory communication cables for the CCITT X.21 electrical interface are available for the 3174 Model 82R. Cables in 6m (20 ft) and 12m (40 ft) lengths are available. Order both the cable (by part number), and the "3174 Model and Interface Conversion Customer Setup Instructions" (by publication order number).

- Cable, RS-232/V.24, 6m (20 ft) - P/N 6423153
- Cable, V.35, 6m (20 ft) - P/N 6423325
- Cable, X.21, 6m (20 ft) - P/N 6168155
- Cable, RS-232/V.24, 12m (40 ft) - P/N 6423154
- Cable, V.35, 12m (40 ft) - P/N 6423327
- Cable, X.21, 12m (40 ft) - P/N 6168156
- CSU Instructions, Canadian French - GA09-0371
- CSU Instructions, English - GA23-0295
- CSU Instructions, French - GA11-0509
- CSU Instructions, Spanish - GA10-8843
- CSU Instructions, Japanese - N:GA23-0295

**IBM 3270 DPC-T3 Adapter (P/N 83X9758):** A cable adapter assembly that permits direct attachment to telephone twisted pair wire, that meets the IBM Cabling System Type 3 specifications, up to a maximum distance of 275m (900 ft.). It is 4.6m (15 ft.) in length with an IBM Dual Purpose Connector (DPC) at one end and a miniature six-pin modular telephone connector on the other end. The telephone connector can be cut off, and the wire inserted directly into telephone punch-down blocks that are capable of accepting stranded telephone wire. The accessory can also be used at the

terminal end of the wire provided the terminal has an IBM Dual Purpose Connector (DPC). (Canada only>Otherwise, a CTPA is required.<)

**Ordering:** Order via NDD DRO or via Distributors authorized to market the IBM Cabling System components. Minimum order quantity is one package which contains ten IBM 3270 DPC-T3 Adapter assemblies.

**SUPPLIES**

None required with the machine order.

Supplies can be ordered from country Direct Marketing Centers or other responsible supplies marketing group.

**X.21/X.25 Keyboard Labels:** Provides 12 sets of seven keyboard stick-on labels (on one sheet) for X.21 switched network or X.25 network operation via a 3174 Model 81R or 82R. Order both the labels (by part number) and installation instructions (by publication order number).

- Sheet of Labels - P/N 1743595
- Instructions, English - G126-0158
- Instructions, Canadian/French - G509-2504

**Cabling Information**

**Coaxial Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "Installation and Assembly of Coaxial Cable and Accessories for Attachment to IBM Products", GA27-2805.

**IBM Cabling System:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System Planning and Installation Guide", GA27-3361.

**(Canada only> Twisted-Pair Telephone Wire:** For proper identification, installation, and application of cable, refer to "IBM/ROLM Planning and Installation Guide for 3270 Coax to Twisted-Pair Adapter, GA27-3722.<)

## 3178 DISPLAY STATION

### PURPOSE

A cathode-ray tube (CRT) display station used in clusters with the 3274, the 3276, the 4701 Controller, or the 4331 Processor with Display Printer Adapter or the 4361 Processor with Display Printer Adapter and Workstation Adapter, for displaying alphanumeric data, and for entering data into and retrieving data from S/360, S/370, a 4300 Processor, 8100 System or 9370 Processor with Workstation Subsystem Controller. A keyboard permits an operator to display and manipulate data on the screen. The 3178 meets both general-purpose and unique display requirements.

### MODELS

**Model C1X:** Displays up to 1,920 characters and provides a 75-key Data Entry Keyboard or 76-key Japanese Katakana Data Entry keyboard.

**Model C2X:** Displays up to 1,920 characters and provides a 87-key Typewriter Keyboard or 88-key Japanese Katakana Typewriter Keyboard.

**Model C30:** Displays up to 1,920 characters and provides a 87-key Typewriter Keyboard which, with its numeric pad, is identical in layout to the keyboard provided with RPQ 8K1038 for the 3278. This model attaches to the 3274 or 3276 and requires a no-charge RPQ in the control unit.

**Model C40:** Displays up to 1,920 characters and provides a 87-key Typewriter Keyboard which, with its numeric pad, is identical in layout to the keyboard provided with RPQ 8K0932 for the 3278. This model attaches to the 3274 or 3276 and requires a no-charge RPQ in the control unit.

Language option selected will be designated by the third character of the model number as follows:

Y	English US
D	Canadian Bilingual/French
K	Japanese Katakana
S	Spanish Speaking

### Prerequisites

Attachment Required on Control Unit

- 3274: Available Category A terminal port.

Mdl C3 attachment to a 3274 requires one of four no-charge microcode RPQs in the 3274: For 3274s with Configuration Support A, B, or C use 8K1034 if the numeric lock feature is not desired, or 8K1035 if the feature is desired; for 3274s with Configuration Support D use 8K1164 if the numeric lock feature is not desired, or 8K1165 if the feature is desired. Caution: RPQs must be ordered well in advance of the mdl C3 to assure receipt prior to receipt of the mdl C3.

Mdl C4 attachment to a 3274 requires one of two no-charge microcode RPQs in the 3274: 8K0931 for 3274s with Configuration Support A, B, or C; or 8K1163 for 3274s with Configuration Support D. Caution: RPQs must be ordered well in advance of the mdl C4 to assure receipt prior to receipt of the mdl C4. Mdls C4 and C2 are mutually exclusive; and C2 are mutually exclusive; they can not be accommodated together on the same 3274. Likewise, the mdl C4 cannot coexist with 3278s or 3279s which use any of these keyboards: #4624, #4627, #4628, #4628, #4640, #4651 or #4652. However, the mdl C4 can be intermixed on the same 3274 with C1s, C3s, and 3278s and 3279s with other standard (non-RPQ) keyboards.

- 3276: Available port or added #3255, #3256 or #3257.

Mdl C3 attachment to a 3276 requires one of two no-charge RPQs in the 3276: use 8K1059 if the numeric lock feature is not

desired, or 8K1060 if the feature is desired. Caution: RPQs must be ordered well in advance of the mdl C3 to assure receipt prior to receipt of the mdl C3.

Mdl C4 attachment to a 3276 requires RPQ 8K0930, a no-charge RPQ, in the 3276. Caution: RPQs must be ordered well in advance of the mdl C4 to assure receipt prior to receipt of the mdl C4. Mdls C4 and mdl C2 are mutually exclusive; they cannot be accommodated together on the same 3276. Likewise, the mdl C4 cannot coexist with 3278s and 3279s which use any of these keyboards: #4624, #4627, #4628, #4640, #4651, or #4652. However, the mdl C4 can be intermixed on the same 3276 with C1s, C3s, and 3278s and 3279s with other standard (non-RPQ) keyboards.

- 4331: Standard Display/Printer Adapter on 4331 or Display/Printer Adapter Expansion (#2001) on a 4331 mdl group 1 or 2.

- 4361: Standard Display Printer Adapter or Workstation Adapter (optional).

Attachment of the 3178 mdl C3 or C4 to the 4331/4361 is not supported.

- 9370: Workstation Subsystem Controller (optional).

- 4701: Available port on optional DCA adapter.

Attachment of the 3178 mdl C3 or C4 to the 4701 is not supported.

A 3178 with Canadian Bilingual/French keyboard requires the following RPQs on the 3274 or 3276:

3274 Configuration Support A & B:	8K1012
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3274 Configuration Support C:	8K1013
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3276 without feature code #1068:	8K1014 or 8K1055
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3276 with feature code #1068:	8K1015 or 8K1054
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**Note:** Canadian Bilingual/French Machine cannot be attached to 4331/4361 Display Printer Adapter or the 4361 Workstation Adapter.

Following printer RPQs are available for the full compatibility with 3178 with Canadian Bilingual/French keyboard:

3262 Line Printer:	S00470 or S00454
3287 Printer:	8Q0164 or 8Q0229

**Note:** Full compatibility with 3178 Canadian Bilingual/French keyboard is provided for 3268 as a standard function.

### HIGHLIGHTS

Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7 X 14 dot matrix in the 9 X 16 contiguous box matrix. Displays a 94 character set: 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters.

(Canada only) > With Canadian Bilingual/French keyboard, displays additional 30 unique Canadian French characters (total 124-character set). < > (Japan only) > With Japanese Katakana keyboards, displays 127-character set). < >

The 3178 offers functions equivalent to the 3278 mdl 2 with features of an 87-key/75-key Keyboard, Keyboard Numeric Lock, Audible Alarm and Security Keylock. The mdl C3 provides a keyboard layout like that provided with RPQ 8K1038 for the 3278.

The mdl C4 provides a keyboard layout like that provided with RPQ 8K0932 for the 3278.

A monospace switch, located on the keyboard, provides the capability of switching to uppercase alphameric mode for 3277 compatibility. Uses 3270 field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphameric, normal/intensified, and displayable/non-displayable.

The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of 3178. When the 3178 is attached to a 3274 or 4300 Processor Display Printer Adapter, a 4361 Workstation Adapter or 9370 Workstation Subsystem Controller, the printer designation is controlled by operator use of the IDENT key and by: (a) a printer authorization matrix which is loaded into the 3274 through a user written host application program, or, (b) a customer definable matrix loaded from the System Diskette at IML time. For further details, see the "IBM 3270 Information Display System Planning and Setup Guide", GA27-2827.

When the 3178 is attached to a 3276, the printer designation is controlled by operator use of the IDENT Key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276. (The host can perform a copy in a manner compatible with 3271/3272 support.)

The 3178 consists of three workstation elements (WSEs): video, keyboard elements. With optional extension cables, provided as accessory, the logic unit may be placed away from the video unit and the keyboard. The logic unit may be mounted on a vertical surface such as the side of a desk or a wall using a mounting bracket provided as a separate accessory.

**Operator Factors:** The 3178 has an etched screen, which minimizes glare and fingerprint. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option, are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard is light and thin, and the keyboard can be adjusted to either 12 degrees by attaching or 6 degrees by detaching the keyboard foot assembly offered as basic.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphameric, special symbol, and cursor move keys have typamatic capability. Double speed cursor typamatic is attached with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. Ten Program Function (PF) keys are available on the Data Entry Keyboard; 24 PF keys are available on the Type-writer Keyboard.

When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D and with a typewriter keyboard (3178 mdl C2), it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 pages for languages supported.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the

screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the "on" position.

These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions.

**Customer Problem Analysis and Resolution:** Functions have been designed into the 3178 to enhance the availability to the customer. This has been done through the use of customer problem analysis and resolution (CPAR) routines and procedures that are used by the operator. See "Customer Responsibilities".

**Customer Setup (CSU):** The 3178 is designated as a customer setup machine except for the Logic Unit Mounting Bracket accessory. The customer is responsible for arranging for the attachment of the Mounting Bracket to the desk, wall or other surface. Setup instructions are included with each machine, as a part of the "IBM 3178 Display Station Operator Reference Guide".

**Customer Responsibilities:** The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Physical setup, connection of cables in customer access areas, switch settings and checkout.
- Contacting an IBM customer service coordinator for attachment of the 3178 communications cable to an on-site serviced IBM control unit where customer access area is not provided.
- Determination of the required number of spares.
- Performing customer problem analysis and resolution (CPAR).
- Returning failing workstation element to the Repair Center or to the Service/Exchange Center with a completed Service/Replacement Order Form for repairs.
- Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
- Each customer must order the IBM 3178 Display Station Description Manual, GA18-2127, for site planning and preparation work since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3178 units for such use. The number of spare units is dependent upon the number of the 3178 units the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Warranty Service and Maintenance:** Customer Carry-In/Repair is available through April 20, 1984 for a five-year maintenance charge. After that time only a one-year plan will be available for new orders. However, in cases where 5-year maintenance contracts have already been signed for the 3178, only those 3178s with warranty periods that expire prior to December 31, 1984 can be included in the 5-year-coverage plan. After December 31, only 1-year coverage will be available.

The following services are available for an annual charge:

IBM On-Site Exchange  
Customer On-Site Exchange  
Customer Carry-In Exchange  
Customer Carry-In Repair

**Note:** Not all service options are available in each country. Contact country Service Department for available service options and applicable terms and conditions of the warranty in your country.

The warranty period is 3 months following the date of installation. The warranty covers each of the five workstation elements. There is no regularly scheduled preventive maintenance recommended by IBM on these units.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center or IBM Service/Exchange Center for repair on a time-and-material basis. The Service/Replacement Order Form is to be completed with all shipments to the Repair Center. Upon request, IBM will provide, for a minimum charge, an estimate of repair charges. This charge covers handling, inspection, cleaning, testing, estimating of repair charges and return shipping charges. The 3178 qualifies for an IBM maintenance agreement immediately following expiration of the service and parts of the service and parts warranty.

If an IBM maintenance agreement is not contracted for immediately following expiration of the service and parts warranty and the customer subsequently wants maintenance coverage, the customer must ship the machine(s) to the designated IBM Repair Center or Service/Exchange Center for an inspection. A minimum charge to cover handling, inspection, cleaning, testing and return shipping charges will be applied. In addition, all time and parts required to qualify the machine for maintenance agreement acceptability will be billed at IBM's then current rates and terms. The machine will then qualify for an IBM maintenance agreement coverage. If on the basis of an inspection, IBM concludes that a machine is not repairable, no further work will be performed and the machine will be returned to the customer subject to minimum charge.

**IBM On-Site Exchange:** This service allows the customer to call the National Support Center on a toll-free number the local CE branch office after the customer has performed CPAR, and have a representative bring a replacement element to the customer site, install and test the replacement element. The failing element becomes the property of IBM.

**Customer On-Site Exchange:** To use the service a customer calls the local CE branch office IBM arranges for delivery of a replacement element to the customer site specified by the customer using various deliver methods

The customer is responsible for the installation and the test of the replacement element using the customer setup (CSU) procedures. The carrier returns the defective element to IBM as instructed by IBM. The delivery transportation charge to/from the customer site is paid by IBM.

**Customer Carry-In Exchange:** After isolating a failing element using CPAR, the customer transports the failing element to an IBM Service/Exchange Center. IBM will provide a replacement element on an exchange basis. The customer is responsible for delivering the failing element to/from the element to/from the Service/Exchange Center. For further information on the Customer Carry-In Exchange, contact IBM.

**Customer Carry-In/Repair:** After isolating the failure to a workstation element, the customer carries in the failing workstation element to a Service/Exchange Center (S/EC). The S/EC will ship the workstation element to an IBM Repair Center. IBM will then ship the repaired workstation element to the S/EC to hold for customer pick-up. Alternatively, the customer may ship the failing workstation element directly to an IBM Repair Center. It is the customer's responsibility to pack the failing WSE in the original shipping container or equivalent and ship it prepaid to the designated IBM Repair Center. IBM will return the repaired unit prepaid.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or

conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable time and material charges. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the local CE branch office may be called for their assistance. The CE will respond a customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer.

Customer owned spare Workstation Elements (WSE) may be installed to replace defective workstation elements by the CE upon customer request. Shipping of defective WSEs to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is available on a per-call basis at the applicable hourly rates and terms.

**Keyboards:** (See Notes 1, 2 and 3 below):

- 75-key Data Entry Keyboard, provided with the mdl C1: Movable with 35 data keys, 10 PF keys and 30 control keys.
- 87-key Typewriter Keyboard, provided with the mdl C2: Typewriter-like layout, moveable with 49 alphameric keys, 26 control keys and 12 PF keys (total 24 PF keys).
- (Japan only) > 76-key Japanese Katakana Data Entry Keyboard: Movable, 4-level shift providing 49 data keys, 10 PF keys and 27 control keys.
- 88-key Japanese Katakana Typewriter Keyboard: Typewriter-like layout, moveable. Provides 4-level shift, providing 49 data keys and 27 control keys. <)
- 87-key Typewriter Keyboard, provided with the mdl C3: Typewriter-like layout, moveable with 49 alphameric keys, 26 control keys and a block of 12 keys which are PF 1-12 in lower shift, PF 13-24 in Alt shift, and a numeric pad (0-9, plus decimal and tab) in upper shift.
- 87-Key Typewriter Keyboard, provided with the mdl C4: Typewriter-like layout, moveable with 49 alphameric keys, 26 control keys and a block of 12 keys which are a numeric pad (0-9, plus decimal and tab) in lower and upper shift and PF 13-24 in Alt shift.

**Notes:**

1. Keyboards used on 3101, 3104, 3275, 3276, 3277, 3278, 3279, or 8775 machines are not interchangeable with keyboards used on 3178.
2. A 0.9m (3 ft) keyboard cable is provided, as basic. The keyboard cables can be extended to 3.0m (10 ft) with a 2.1m (7 ft) Keyboard Extension Cable provided as accessory.
3. Keyboard foot assembly is provided as basic. It provides a keyboard surface angle of 12 degrees (6 degrees without the foot assembly).

**Publications:** "IBM 3178 Display Station Description", GA18-2127; "IBM 3178 Display Station Operator Reference Guide". For others, see KWIC Index, G320-1621, or specific system bibliography.

#### SPECIFY

- Voltage (100-127V, AC, 1-phase, 3-wire, 50-60 Hz or 200-240V, AC, 1-phase, 3-wire, 50-60 Hz)
- Power Cord: (Canada only) > Specify #9514 for a 3.0m (9.8 ft) cord with nonlocking plug, or #9511 for a 1.8m (6 ft) cord with nonlocking plug. For all other countries a 3.0m (9.8 ft) cord is provided with nonlocking plug. <)

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS

Field installable.

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual- Physical Planning", GA27-2787, and Coaxial Cable and Associated Manual, GA27-2805.

The following accessories can be ordered

**Extension Cables:** Provides 2.1m (7 ft) Video Extension Cable, (Total 2.7m (9 ft) with 0.6m (2 ft) standard Video cable), and 2.1m (7 ft) Keyboard Extension Cable (Total 3.0m (10 ft) with 0.9m (3 ft) standard keyboard cable). With this accessory, the Logic unit can be located away from the Video unit and the Keyboard.

Extension Cables are designated as a customer setup accessory. Setup instructions are included with each accessory.

P/N 5641828

**Logic Unit Mounting Bracket:** Provides a mounting bracket to mount Logic unit on a vertical surface such as the side of a desk or a wall when Logic unit is placed away from Video unit and Keyboard using Extension Cables accessory. Arrangements for mounting the bracket is the customer's responsibility.

P/N 5641650

**Note:** Logic Unit Mounting Bracket accessory is not covered by an IBM maintenance agreement. Order as an accessory when the replacement is needed.

**Switch Control Unit:** Permits switching operational control of a 3178 between two different control units. The customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit. There is no switch control unit designed specifically for the 3178, but use may be made of the unit designed for the 3278 or 3279. The 3279 switch is suggested, even though it does not fit readily under the foot of the 3178, since it is better adapted than the 3278 switch to a free standing installation.

**Ordering Instructions:** The 3279 switch control unit (which includes language independent setup instructions for use with the 3178) is ordered by P/N:

P/N 6052157	English
P/N 6052158	Canadian French
P/N 6052160	Japanese
P/N 6052159	Spanish

Switch control units are for field installation only.

Refer to the M3279 pages for more information about the 3279 switch control unit.

## CUSTOMER REPLACEMENT PARTS

Following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Description	P/N
Keyboard Extn Cable	5641815
Video Extension Cable	5641814
Field Packaging Material	
For Logic	8665651
For Keyboard	7387286
Keys (see Note)	5641830
	for Flat key
	5641800
	for Tulular key

**Note:** The 3178 is shipped with two keys. Additional keys may be purchased from IBM. Key identification number must accompany each order. Note: If the key identification number is unknown, the Logic WSE should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on a time and material basis.

## MACHINE ELEMENTS

Individual 3178 workstation elements may be ordered for use as replacements or spares.

**3178 Workstation Elements:** Order Entry: Specify MACHINE ELEMENT P/N at time of order entry.

To Fit Model	Workstation Element	P/N (See Note)
C1/C2	Video	5894000(All countries)
C3/C4	Video	5894000(All countries)
C1/C2	Logic	5640980(Low-Voltage countries)
C3/C4	Logic	5640980(Low-Voltage countries)
C1/C2	Logic	5641793(High-Voltage countries)
C3/C4	Logic	5641793(High-Voltage countries)
C1	Keyboard	5640991(English US)
C2	Keyboard	5640987(English US)
C3	Keyboard	6052101(English US)
C4	Keyboard	6052141(English US)
C1	Keyboard	4742679(Canadian Bilingual/French)
C2	Keyboard	4742683(Canadian Bilingual/French)
C1	Keyboard	4742680(Katakana)
C2	Keyboard	4742684(Katakana)
C1	Keyboard	4742681(Spanish Speaking)
C2	Keyboard	4742685(Spanish Speaking)

**Note:** Logic does not include a power cord for each country. Keyboard includes a pair of Keyboard Feet. Video does not include Pedestal.

The following parts are covered by the IBM maintenance agreements but may be ordered individually if spares or replacements are desired.

Description	P/N
Pedestal	5641300
Keyboard	5641297
Feet (pair)	
(Canada only)	
Power Cord	5640671 (3.0m cord)
	5640670 (1.8m cord)<
	5640662 for Argentina/ Brunei Malaysia/ Singapore/Hong Kong
	5640663 for Indonesia
	5640664 for Australia, New Zealand
	5640668 for Chile
	5640671 for Bahamas/ Barbados Bermuda/Bolivia
	Colombia/Costa Rica
	Dominican Republic
	Ecuador/El Salvador
	Guatemala/Guyana

Honduras/Jamaica  
Japan/Korea/Mexico  
Netherland Antilles  
Nicaragua/Panama  
Philippines/Taiwan  
Trinidad Tobago  
Venezuela  
5641389 for Sri Lanka

**Customer Responsibilities:** The customer's responsibilities are the same as those above under "Customer Responsibilities".

**Site Planning and Preparation:** These are the responsibility of the customer. The customer should have on hand, or should order the IBM 3178 Display Station Description Manual (GA18-2127) for site planning and preparation work.

**Warranty:** Category B

**Maintenance:** Maintenance for individual workstation element is only available on a time-and-material basis at an IBM Repair Center or through an IBM Service/Exchange Center. Minimum charge is applied. Maintenance for workstation element is different by country. Contact country Service Department for the available maintenance in your country.

**SUPPLIES (NONE)**

## 3179 COLOR GRAPHICS DISPLAY STATION MODEL G

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 3179-G Color Graphics Display Station, a new, low priced, color graphics display member of the 3270 Information Display System. The 3179-G is a compact, 8-color, 1,920- or 2,560-character, 14-inch CRT with bright, clear colors and a smudge-resistant screen surface. The graphics capabilities are significantly enhanced by the provision of an all-points-addressable (APA) screen and capability to natively attach the IBM Color Printer (3852 Model 2) for local screen copy.

The 3179-G features the 122-key or 124-key Katakana modifiable keyboard with 24 program function (PF) keys, a numeric pad, improved cursor-move function and a Selectable Field Tab function key for light-pen detectable fields.

The 3179-G is offered in two models:

1. Model G10 122-key or 124-key Katakana Typewriter keyboard
2. Model G20 122-key or 124-key Katakana Typewriter/APL2 keyboard

Host interactive graphics support on S/370, 43XX, 303X, 308X, 3090, and 9370 processors is included in an enhancement to Release 4 of GDDM (Graphical Data Display Manager). Screen management functions are extended to interact with graphics information as well as with alphanumeric information.

One 3979 Expansion Unit may be attached to the 3179-G. The 3979 allows attachment of the 5277 Mouse, 6180-2, 6184, and the 7371, or 7372 Color Plotters. The 3979 provides an alternative port for the IBM Color Printer (3852 Model 2) when the 3979 is attached to the 3179-G.

### MODELS G1, G2

**Model G1 G1x:** Displays up to 2,560-characters in 32 lines of 80-characters each. 8 colors, APA buffer and external highlighting. Provides 122-key or 124-key Katakana Typewriter keyboard.

**Model G2 G2x:** Displays up to 2,560-characters in 32 lines of 80-characters each. 8 colors, APA buffer and external highlighting. Provides 122-key or 124-key Katakana Typewriter/APL2 keyboard.

Language option selected will be designated by the third character of the model number.

Specify the model number shown as follows:

GxY US English  
GxD Canadian French  
GxK Japanese Katakana  
GxS Spanish Speaking

Where "x" denotes keyboard model specification.

### Limitations:

- A 3178, 3179-1, 3180-100, 3191, 3192, 3278, or 3279 Display Station must be attached to Port 0 of the 3174, 3274 Control Unit or 9370 Workstation Subsystem Controller for customization and diagnostic support. (This display may be attached via a 3299.)
- Category "B" terminals (e.g., 3277 Display Stations) cannot be used on the same 3274 when these units are customized to support the 3192-G.
- Plotters are only supported via IEEE488 interface.
- Existing alphanumeric applications will run on the 3179-G unless the program is affected by 3274 Control Unit configuration restrictions (e.g., no Category B terminals) or required hardware functions not available with the 3179-G, e.g., magnetic readers, light-pen, triple-plane programmable symbols, encryption/decryption or unsupported screen sizes.

- BSC Copy Command is not supported.
- Programmable Symbols (PSA and PSB only) are supported in single color.

### Prerequisites:

- A 3178, 3179-1, 3180-100, 3191, 3192, 3278, or 3279 Display Station must be attached to Port 0 of the 3174, 3274 Control Unit or 9370 Workstation Subsystem Controller for customization and diagnostic support.
- 3274 Control Unit Attachment: The 3179-G models must be attached to the IBM 3274 Control Unit with Configuration Support D at microcode Release Level 65 and Load Diskette #9301 or #9311 (except Katakana) or #9305 or #9315 (Katakana only).

**Note:** Since a feature code load diskette is used to support the 3193, 3290, 3179-G, and the 3192-G, customers should read the diskette label. Feature Code (Except APG>#9301<) (APG only>#9301, #9305<) support the 3179-G, 3192-G, and 3290. Feature Code (Except APG>#9311<) (APG only>#9311, #9315<) support the 3179-G, 3192-G, and 3193. The label will state if the 3179-G is supported.

- 3174 Control Unit Attachment: The 3179-G models attach to the 3174 Control Unit and require Load Diskette feature code #9016.
- Workstation Subsystem Controller of the IBM 9370 Processor Attachment: The 3179-G models attach to the Workstation Subsystem Controller, feature code #6020, of the 9370 Processors and require Load Diskette feature code #9016.

**Note:** Only one feature code Load Diskette (#6020) is required to support the 3179-G when attached to the 3174 Control Unit or to the Workstation Subsystem Controller of the 9370 Processor. Refer to the "3174 Control Unit Customization Guide" (GA23-0214).

- GDDM Release 4 must be installed on the host processor for graphic support. The following PTFs must be installed:

	OS	DOS/VSE	VM/370
GDDM	UP90176	UP90177	UP90178
Base	UP59304	UP59305	UP59306
PGF	UP90179	UP90180	UP90181
	UP59307	UP59308	UP59309

- Customers planning to use a 3179-G with ISPF Version 2 must install a prerequisite PTF as shown below:

- ISPF MVS (5665-319) Version 2 Release 1 - UZ80300
- ISPF MVS (5665-319) Version 2 Release 1.1 - UZ80301
- ISPF MVS (5665-319) Version 2 Release 1.2 - UZ80302
- ISPF VM (5664-282) Version 2 Release 1 - UV16080

### BSC Users:

- Customers installing the 3179-G for use over binary synchronous communication lines should customize the IBM Control Unit with BSC Enhanced Communications Option (176).
- Customers operating under ACF/VTAM with ACF/NCP over Binary Synchronous (BSC) communication lines must be at an ACF/NCP Version 3 or higher level. Customers should contact their service representative for the following prerequisite PTFs:

NCP V3 on 3705: PTF UR12445  
NCP V3 on 3725: PTF UR12446

NCP V4: PTF UR12444  
SSP V1.2.2: PTF UR13293  
SSP OS/MVS: PTF UR13294  
SSP VM: PTF UR13295

**Customer Setup (CSU):** The 3179-G is designated as a Customer Setup machine. A copy of the "IBM 3179-G Color Graphics Display Station Setup Instructions", GA18-2262, is included with each machine.

## HIGHLIGHTS

- The 3179-G is data stream compatible with today's 3270 displays in alphanumeric application environments. Most mainframe interactive graphics applications that run under GDDM Release 3 can be run unchanged on the 3179-G with GDDM Release 4.
- Provides significant new functions and host graphic off-load when compared to the 3279 Model S3G.  
  
Attachment of IBM Color Printer (3852 Model 2) to logic unit of the 3179 Model G for local screen copy.  
  
**Note:** Must specify printer interface cable #2058 (P/N 6342058) for Printer (3852 Model 2).  
  
Host processing is reduced and, for most applications, controller utilization will be improved by using the 3179-G to off-load vector-to-raster conversion and symbol set usage.
- Allows attachment of one 3979 Expansion Unit. The 3979 extends the configuration capability to connect one 5277 Mouse, one Printer (3852 Model 2) and one of either the 6180-2, 6184, 7371, or 7372 Color Plotters to the 3179 Model G.  
  
**Note:** Must specify printer interface cable #2058 (P/N 6342058) for the Printer (3852 Model 2). Only one plotter may attach, specify IEEE488 interface #9920 and cable #5040 for 7371 or 7372 Plotter).
- Selectable Field Tab key and Cursor Select key provide for selection of light-pen detectable fields in lieu of a light-pen.
- Improved cursor movement. When cursor keys are depressed, the cursor accelerates. Two cursor types are provided: Alphanumeric and graphic. Graphic cursor (Cross and Cross Hair) supports PEL-level resolution. The 5277 Mouse may be used to control both alphanumeric and graphics cursors on the screen. The graphics cursor controlled by the cursor positioning keys or the 5277 Mouse provides coordinate (x,y) input via the 3979 Expansion Unit.
- Screen Characteristics: 8-colors (red, green, blue, white, yellow, turquoise, pink, and black background).
- An all-points-addressable (APA), 14-inch CRT color display provides a bright, steady presentation of 720 x 384 picture elements in a viewable area of 240mm (9.4 in.) by 172mm (6.8 in.).
- Requires no color convergence adjustments.
- Transient patterns associated with buffer loading of programmed symbols (PS) are eliminated.
- Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.
- 2 fixed-character fonts can be selected by host applications program for data presentation:
  - Up to 1,920-characters can be displayed as 80-characters by 24 lines.
  - Up to 2,560-characters can be displayed as 80-characters by 32 lines.
  - Keyboard Characteristics.
- Two keyboards: Typewriter and Typewriter/APL2. A modifiable keyboard with 122-keys or 124-key Katakana provides 24

individual program function keys, a numeric pad, and improved cursor-move keys.

- A keyboard definition utility is supported in the 3179-G to allow definition of customer specific keyboard layouts. A keycap removal tool is standard so that keycaps can be interchanged conveniently.
- The 3274 Downstream Load Diskette #9301 or #9311 (except Katakana), or #9305 or #9315 (Katakana only) provides space for three modifiable keyboard layouts per control unit. The diskette is supplied via microcode Release Level 65 or higher for the 3274 with Configuration Support D.

The 3174 Control Unit and the Workstation Subsystem Controller (#6020) of the 9370 Processor Downstream Load Diskette #9016 (applicable world-wide) provides space for three modifiable keyboard layouts. (Refer to the "3174 Control Unit Customization Guide", GA23-0214.)

The modified keyboard layouts are defined by switches located on the underside of the keyboard (refer to "3179-G/3192-G Color Graphics Display Station Operator Reference and Problem Solving Guide" (GA18-2591) for information) and can be set by the operator.

Low-profile keyboard with coiled cable. Keyboard provides operator adjustment for three angles of inclination: 6, 12, or 18 degrees.

- Entry Assist is standard.
- The Response Time Monitor and Alert capability are supported.
- Audible Alarm and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position.
- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.
- Through the use of error indicators, off-line tests, and the "Operator Reference and Problem Solving Guide", the customer will isolate a failing element for repair or replacement.

**Operator Factors:** The 3179-G has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option, are provided. An enhanced full-screen cross-hair cursor or an alternate cross cursor is featured for graphic operations. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator via switches on the keyboard underside. The cable connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard is thin and the keyboard slope can be adjusted by the user to 6, 12, or 18 degrees.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic. All alphanumeric and special symbol keys have typematic capability. Cursor move keys cause acceleration of the cursor when held down. Simultaneous depression of vertical and horizontal will cause diagonal movement. Fields of data can be selected by positioning the cursor, then using the cursor select key. If data fields are light-pen detectable, the Selectable Field Tab function key will provide more rapid location. The 24 Program Function (PF) keys are provided on the keyboard in lowercase mode. Entry assist is supported when attached to a 3274 Control Unit with Configuration Support D at Release 64 or higher, or to the 3174 Control Unit and the Workstation Subsystem Controller (#6020) of the 9370 Processors. The 3179-G Entry Assist provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, word-wrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is in-

tended for use primarily with a specific set of host editor programs. (See M3274 pages for details.)

**Operating Environment:** Operating environment of configurable I/O units are different.

- 3179-G, 3979, 5277, 6180-2, 6184, 7371, or 7372 Class C: 10 - 40.6 C (50-105 F); 8-80% Relative Humidity
- Printer (3852 Model 2) Class B: 15.6 - 32.2 C (60-90 F); 20-80% Relative Humidity

**Security Facilities:** Data security functions provided by the 3179-G are non-display field control (specified in the attribute byte) and the security keylock.

A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents display of data on the display terminal unless the key is turned to the UNLOCK position. The key is removable in either LOCK or UNLOCK positions.

User management is responsible implementation of these functions. If sensitive data is sent over external communications facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures" (G320-5649).

These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of the unit.
3. Physical setup, connection of cables in customer access area, switch settings and checkout.
4. Contacting an IBM customer service coordinator for attachment of the 3179-G communications cable to an on-site serviced IBM control unit where customer access area is not provided.
5. Determination of the required number of spares.
6. Performing Customer Problem Analysis and Resolution (CPAR).
7. Returning a failing element to the Repair Center (for Customer Carry-In Repair maintenance) or to the Service/Exchange Center (for Customer Carry-In Exchange maintenance) with a completed Service/Replacement Order Form for repairs.
8. Contact IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service required.
9. Removing customer-owned keycaps prior to submitting a keyboard for exchange or repair service and return the standard layout keyboard to IBM.
10. Returning security keys to IBM if any exchange service of Logic Element is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
11. Ordering the "IBM 3179-G/3192-G Color Graphics Display Station Description Manual", GA18-2589, for site planning and preparation work since it is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3179-G units for such use. The number of spare units is dependent upon the number of the 3179-G units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares can be ordered as a complete machine or as individual elements.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3179-G to enhance the availability to the customer. This has been done through the use of Customer Problem Analysis and Resolution (CPAR) routines and procedures that are used by the operator. See "Customer Responsibilities".

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable hourly service rates and terms. Altered elements will not be eligible for the exchange or replacement services.

**On-Site Assistance:** If the customer desires assistance in performing Customer Problem Analysis and Resolution (CPAR), the customer calls local IBM service branch office. IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer.

Customer-owned spare elements can be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is provided on an hourly service basis at the applicable hourly service rates and terms.

**Keyboards:** (See Notes 1, 2 below)

- 122-key Typewriter Keyboard: Typewriter-like layout, with 49 alphanumeric keys, 31 control keys, 24 program function keys and 18 numeric pad keys.
  - 122-key Typewriter/APL2 Keyboard: Typewriter-like layout, with 49 alphanumeric keys, 31 control keys, 24 program function keys and 18 numeric pad keys.
  - 124-key Japanese Katakana Typewriter Keyboard: Typewriter-like layout. Provides 4-level shift, providing 50 alphanumeric keys and 32 control keys, 24 program function keys and 18 numeric pad keys.
  - 124-key Japanese Katakana Typewriter/APL2 Keyboard: Typewriter-like layout, movable. Provides 4-level shift, providing 50 alphanumeric keys and 32 control keys, 24 program function keys and 18 numeric pad keys.
1. Keyboards used on other products are not interchangeable with the keyboard used on 3179-G.
  2. A coiled keyboard cable is provided with each keyboard allowing individual keyboard positioning.

#### **Publications:**

- GA18-2262 IBM 3179-G Color Graphics Display Station Setup Instructions
- GA18-2271 IBM 3179-G Color Graphics Display Station Operator Reference and Problem Solving Guide
- GA18-2589 IBM 3179-G/3192-G Color Graphics Display Station Description
- SY18-2099 IBM 3179-G/3192-G Color Graphics Display Station Repair Center Maintenance Information
- GA18-2272 IBM 3979 Expansion Unit Setup Instructions (for low-voltage countries)
- GA18-2349 IBM 3979 Expansion Unit Setup Instructions (for high-voltage countries).

**Note:** These manuals can be ordered from the country publications centers. A copy of the "IBM 3179-G Color Graphics Display Station Setup Instructions", GA18-2262, and "IBM 3179-G Color Graphics Display Station Operator Reference and Problem Solving Guide", GA18-2271, will be shipped with each machine. Contact your country publication department for the order form number assigned for each country.

## SPECIFY

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz, or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft) line cord with nonlocking plug. The country number of the ordering country determines the default line for line cord and shipping group.
- Maintenance Option: Warranty Option - #9799.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted-pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

The following keyboard and switch control unit\* accessories can be ordered:

- 6341707 Clear Lens Keycaps/Paper Inserts/Removal Tool
- 1351710 Blank Keycaps (Light) and Removal Tool
- 1351728 Blank Keycaps (Dark) and Removal Tool
- 1351717 Keycap Removal Tools (6 tools)
- 6341704 Paper Inserts (150 light and 150 gray)
- Keyboard overlays (10 overlays):
  - 6342112 English
  - 6342113 Spanish
  - 6342115 French
  - 6052157 English
  - 6052160 Japanese
  - 6052158 Canadian French
  - 6052159 Spanish

\* Permits switching operational control of the 3179-G between two different control units. The customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit. There is no switch control unit designed specifically for the 3179-G, but use can be made of the unit designed for the 3278 or 3279. The 3279 switch is suggested even though it does not fit readily under the foot of the 3179-G, since it is better adapted than the 3278 switch to a free-standing position.

For local charges consult your IBM marketing representative.

## CUSTOMER REPLACEMENT PARTS

Following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

## Field Packaging Material:

- 6317356 for Video
- 6316868 for Logic (or Expansion Unit)
- 6316883 for Keyboard

**Keys (6342xxx):** (See Note) 3 digits of key code numbers.

**Note:** The 3179-G is shipped with two keys. Additional keys can be purchased from IBM. Key identification number must accompany each order. If the key identification number is unknown, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis.

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3179-G.

**Order Entry:** For shipment, specify Machine Element (P/N) at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

**Site Planning and Preparation:** These are the responsibility of the customer. The customer should have on hand, or should order the "IBM 3179-G/3192-G Color Graphics Display Station Description", GA18-2589, for site planning and preparation work.

The video, logic, keyboard, pedestal and line cord of the 3179-G Color Display Station can be ordered as follows:

- 8233436 Video: Canada
- 8233437 Video: Bermuda, Bahamas, Barbados, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Jamaica, Korea, Nicaragua, Netherlands-Antilles, Mexico, Panama, Surinam, Taiwan, Trinidad
- 8233389 Video: Bolivia, Ecuador, Philippines
- 8233440 Video: Afghanistan, Venezuela
- 8233391 Video: Australia, New Zealand
- 8233392 Video: Argentina, Burma, Brunei, Bangladesh, Chile, Hong Kong, Indonesia, Malaysia, Peru, Paraguay, Singapore, Sri Lanka, Thailand, Uruguay
- 6342040 Logic: All countries
- 1385152 Keyboard-Typewriter: Canadian French
- 1385168 Typewriter/APL2
- 1385154 Keyboard-Typewriter: Japanese Katakana
- 1385170 Typewriter/APL2
- 1385153 Keyboard-Typewriter: Spanish Speaking
- 1385169 Typewriter/APL2
- 1385151 Keyboard-Typewriter: US English
- 1385167 Typewriter/APL2
- 5954170 Pedestal: All countries
- 5881854 Video Cable: All countries
- 6952353 Line Cord: Brunei, Malaysia, Singapore, Hong Kong
- 6952317 Line Cord: Afghanistan, Indonesia, Surinam
- 6952308 Line Cord: Australia, New Zealand
- 6952371 Line Cord: Chile
- 6952285 Line Cord: Argentina, Paraguay, Uruguay
- 6952297 Line Cord: Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands-Antilles, Nicaragua, Panama, Philippines, Taiwan, Trinidad
- 6952344 Line Cord: Bangladesh, Burma, Sri Lanka
- 6952397 Line Cord: Peru, Thailand, Venezuela

## SUPPLIES (NONE)

## 3179 COLOR DISPLAY STATION

### PURPOSE

A high quality, 14-inch, cathode-ray tube (CRT) color display station used in clusters with the 3274, the 3276, the 4331 or the 4361 Processor with Display/Printer Adapter or the Workstation Adapter or 9370 with Workstation Subsystem Controller for displaying alphanumeric data, and for entering data into and retrieving data from S/360, S/370, 303X, 308X, 4300 Processor, or 8100 System.

In base color operation, data fields can be displayed in four colors. A keyboard permits an operator to display and manipulate data on the screen in a flexible and efficient manner.

In extended color operation attached to a 3274, or the 4361 Workstation Adapter, data can be displayed at both character and field level in 7 colors with a choice of extended highlighting.

The 3179 meets both general-purpose and unique display requirements.

### MODEL 1

**Model 1 10X:** Displays up to 1,920 characters and provides a 122-key Typewriter Keyboard or 124-key Japanese Katakana Typewriter Keyboard

Language option selected will be designated by the third character of the WTAAS model number as follows:

- Y US English
- D Canadian French
- K Japanese Katakana
- S Spanish Speaking

**Prerequisites:** A 3179 requires a 3274, 3276 with appropriate Terminal Adapter or a 4331, 4361 Processor with the standard Display/Printer Adapter or Display/Printer Adapter Expansion or the 4361 Workstation Adapter or 9370 with Workstation Subsystem Controller. See M3274, 3276, 4331, or 4361 pages.

For 3179 attachment: The 3179, in Emulation Mode, can be attached to a 3274, 3276 or the Display/Printer Adapter of the 4331/4361 or the 4361 Workstation Adapter, without a microcode change. When a 3179 keyboard is used in Emulation mode, it must be attached to the following EC or microcode Release Levels of the control unit or Display/Printer Adapter:

- 3276: Any EC level
- 3274:
  - Configuration Support A - Level 15 or higher
  - Configuration Support B - Level 26 or higher
  - Configuration Support C - Level 47 or higher
  - Configuration Support D - Level 61 or higher
  - Configuration Support P - Any level
  - Configuration Support T - Level 31 or higher

To attach the 3179 in Native Mode requires a 3274 with Configuration Support D with microcode Release Level 63. Microcode Release Level 63 is also a prerequisite for changing the layout of the Modifiable Keyboard.

Native mode is not supported on the 4331, and 4361 Display Printer Adapter and Workstation Adapter.

Canadian French keyboard requires the following I/O Interface Code Table in the 3274, 3276, 4331, or 4361:

- Emulation Mode -- Canadian French
- Native Mode -- Canadian French Bilingual

**Customer Setup (CSU):** The 3179 is designated as a customer setup machine. Setup instructions are included with each machine, as a part of the "3179 Color Display Station Operator Guide".

### HIGHLIGHTS

Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7 X 14 dot matrix in the 9 X 16 contiguous box matrix. Displays a 94-character set: 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric, and 32 special characters.

The 3179 consists of 5 machine elements: Video, logic, keyboard, pedestal, and line cord.

The Modifiable Keyboard is standard. Keyboard switch setting by operator allows either of two modes of keyboard operation:

- Emulation Mode: See "Prerequisites".

The 3179 keyboard emulates existing 3178, 3278, or 3279 keyboards.

- Native Mode: When a 3179 keyboard is used in Native mode, it must be attached to a 3274 with Configuration Support D (microcode Release Level 63).

If the 3274 is configured to support APL or Data Entry the necessary keycaps to appropriately change the keyboard are made available as accessories.

The 3274 Keyboard Definition Utility is used to redefine the keyboard layout. Additionally, the construction of the keyboard is such that all standard size (or square) keys have a removable keycap upon which the nomenclature is engraved. With these facilities, a customer may define the keyboard layout by swapping, moving, deleting or copying keys.

Sets of keycaps will be made available as accessories to accommodate some common layouts. Clear lens keycaps with paper inserts will also be provided for customer-unique labeling.

The 3274 Language Diskette provides space for 7 Keyboard Layout tables (3 standard and 4 modified). A maximum of 4 of these 7 may be selected from the diskette. The Language Diskette will be supplied via microcode Release Level 63 from (Canada only) Raleigh Microcode Administration (except Canada) Summary (except Canada) for 3274 with Configuration Support D. The language diskette permits display of the standard layout. By using a predefined set of commands and cursor positioning, the keyboard layout can be modified from the terminal attached to port "A-0" of the 3274. The keyboard layouts are identified to the 3274 by switches located under the keyboard, which can be set by an operator. The ability to customize keyboard layouts is available on the 3179 connected to a 3274 with Configuration Support D and microcode release level 63.

When attached to the 3274 with Configuration Support D with microcode release level 63, the 3179 supports various keyboard layouts including the following keyboard layouts by using the accessory keycaps. See "Accessories", "APL Data Entry 87-key Typewriter".

Native mode is not supported on the 4331, and 4361 Display Printer Adapter and Workstation Adapter.

With Canadian French keyboard, displays additional 30 unique Canadian French characters (total 124-character set). (Japan only: With Japanese Katakana keyboards, displays 127-character set.)

The 3179 offers functions equivalent to both the 3279 Models S2A and S2B.

A monospace switch, located on the logic element, provides the capability of switching to uppercase alphanumeric mode for 3277 compatibility. The 3179 uses 3270 field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphanumeric, normal/intensified, and displayable/non-displayable.

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The 3179 uses the 3270 formatting attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following:

- Protected and intensified - White
- Unprotected and intensified - Red
- Protected and normal intensity - Blue
- Unprotected and normal intensity - Green

Base color switch is provided allowing the 3179 to run in 'monochrome mode'. In this mode, fields are displayed in green for normal intensity and white for intensified.

Extensions to the 3270 data stream supported by appropriate 3274 features or the 4361 Workstation Adapter, and the 3179 provide the following field and character attributes:

- Extended Color:
  - Red
  - Blue
  - Green
  - White
  - Yellow
  - Turquoise
  - Pink
- Extended Highlighting:
  - Reverse video
  - Blink
  - Underscore

Each attribute can be specified independently of any other. Extended color and extended highlighting are supported on the 3274 Models 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, and 61C. For extended color and extended highlighting on the 3179, the Structured Field and Attribute Processing Option of Configuration Support C or Configuration Support D is required on the 3274. For base color operation, the 3179 will attach to all models of the 3274, 3276 except Model 1, and the Display/Printer Adapter of the 4331, 4361, and 9370 Workstation Subsystem Controller.

The 3179 does not require a 3276 Color Display Attachment (#1950) for base color operation.

The operator can initiate a local display-to-printer monochrome or color copy function (i.e., without host intervention) from the keyboard of a 3179. When the 3179 is attached to a 3274 or 4300 processor Display/Printer Adapter or a 4361 Workstation Adapter or a 9370 Workstation Subsystem Controller, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user-written host application program, or
2. A customer-definable matrix loaded from the System Diskette at IML time. For further details, see the "3274 Control Unit Planning, Setup and Customizing Guide", GA27-2827, (Configuration Support A, B, C, P, or T), or "3274 Customizing Guide", GA23-0065, (Configuration Support D).

When the 3179 is attached to a 3276, the printer designation is controlled by operator use of the IDENT Key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

Response Time Monitor (RTM) is a tool resident in the 3274 whereby inbound host attention operations from attached display terminals can be timed, recorded and displayed. The RTM function is selectable when the 3274 is customized. The ultimate purpose of RTM is to provide for evaluating and verifying the performance of a network system and its components. RTM is supported by the 3274 Configuration Support C and D.

Alert function, selectable during customization of the 3274 and supported by the 3179, reports problem determination data to the host for recording and display when NPDA Version 3 is installed in the host. The workstation operator cannot initiate an Alert message. Alert is supported by the 3274 Configuration Support C and D.

**Operator Factors:** The 3179 has an etched screen, which minimizes glare and fingerprint. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful

operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option, are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard is thin, and the keyboard slope can be adjusted by the user to 6, 12, or 18 degrees.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen), and cursor select keys are all basic. All alphameric, special symbol, and cursor move keys have typamatic capability. Double-speed cursor typamatic is achieved by simultaneously depressing the ALT key and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 Program Function (PF) keys are provided on the keyboard in no shift positions.

When attached to a 3274 with Configuration Support C with the Entry Assist RPQ or with Configuration Support D, the 3179 provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, word-wrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 pages for details.

**Note:** Keyboard Overlay may be used for the nomenclature in Native Mode. Clear lens keycaps with paper inserts accessory or sticky labels which are shipped with the 3274 or ordered as publications may be used for the nomenclature in Emulation Mode.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the "On" position.

These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions.

**Customer Problem Analysis and Resolution:** Functions have been designed into the 3179 to enhance the availability to the customer. This has been done through the use of Customer Problem Analysis and Resolution (CPAR) routines and procedures that are used by the operator. See "Customer Responsibilities" below.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup, connection of cables in customer access areas, switch settings and checkout.
4. Contacting an IBM customer service coordinator for attachment of the 3179 communications cable to an on-site serviced IBM control unit where customer access area is not provided.
5. Determination of the required number of spares.
6. Performing CPAR.
7. Returning a failing workstation element to the Repair Center (for Customer Carry-In Repair maintenance) or to the Service/Exchange Center (for Customer Carry-In Exchange maintenance) with a completed Service/Replacement Order Form for repairs.
8. Contact IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Removing customer-owned keycaps (include IBM accessory keycaps) before any exchange service and return the standard layout keyboard to IBM.

10. Returning security keys to IBM if any exchange service of Logic Element is required. If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.
11. Ordering the "IBM 3179 Display Station Description Manual", GA18-2177, for site planning and preparation work since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3179 units for such use. The number of spare units is dependent upon the number of 3179 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as individual workstation elements. See "Accessories" for ordering individual element.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable time-and-material charges. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the local IBM service branch office. IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer.

Customer-owned spare elements may be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is available on a per-call basis at the applicable hourly rates and terms.

**Keyboards:** (See Notes 1, 2 below)

- 122-key Typewriter Keyboard: Typewriter-like layout, movable with 49 alphameric keys, 31 control keys, 24 program function keys and 18 numeric pad keys.
- 124-key Japanese Katakana Typewriter Keyboard: Typewriter-like layout, movable. Provides 4-level shift, providing 50 data keys and 32 control keys.

**Notes:**

1. Keyboards used on other products are not interchangeable with keyboards used on 3179.
2. A coiled keyboard cable is provided with each keyboard.

**Publications:**

- GA18-2177 IBM 3179 Color Display Station Description
- GA18-2180 IBM 3179 Color Display Station Operator Guide
- SY18-2081 IBM 3179 Color Display Station Repair Center Maintenance Information
- GA18-2110 Keyboard Overlay

For others, see "KWIC Index", G320-1621, or specific system bibliography.

**SPECIFY**

- Power: 100-127V, AC, 1-phase, 3-wire, 50-60 Hz or 200-240V, AC, 1-phase, 3-wire, 50-60 Hz
- Line Cord: 3.0m (9.8 ft), nonlocking plug.

**SPECIAL FEATURES (NONE)**

**MODEL CONVERSIONS (NONE)**

**ACCESSORIES**

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

Various keyboard accessories and switch control unit accessory can be ordered.

The following accessories can be ordered:

**Data Entry Keycaps and Keycap Removal Tool (1351741):** US English.

**PF Keycaps for 87-key Typewriter Keyboard Layout (1351742):** (US English) 2 sets and keycap removal tool.

**Blank Keycaps Light and Keycap Removal Tool (1351710):** 60 caps.

**Blank Keycaps Dark and Keycap Removal Tool (1351728):** 60 caps.

**Clear Lens Keycaps with Paper Inserts and Keycap Removal Tool (6341707):** 60 caps, 60 light inserts, and 60 dark inserts.

**Paper Inserts for Clear Lens Keycaps (6341704):** 150 light and 150 dark.

**Keycap Removal Tool (1351717):** 6 tools.

**Keyboard Overlay for Extended Select Functions (6341703):** 10 sheets.

**APL keycaps (US English) and Keycap Removal Tool (1351711).**

**APL Keycaps and Keycap Removal Tool::** 1 set.

Canadian French - 1351726  
Japanese Katakana - 1351718  
Spanish Speaking - 1351727

**Switch Control Unit\*:**

English - 6052157  
Japanese - 6052160  
Canadian French - 6052158  
Spanish - 6052159

\* Permits switching operational control of a 3179 between 2 different control units. The customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit. There is no switch control unit designed specifically for the 3179, but use may be made of the unit designed for the 3278 or 3279. The 3279 switch is suggested, even though it does not fit readily under the foot of the 3179, since it is better adapted than the 3278 switch to a free-standing installation.

## CUSTOMER REPLACEMENT PARTS

Following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

### Field Packaging Material:

For Video - 6316869  
For Logic - 6316868  
For Keyboard - 6316883

**Keys:** (See Note) The Key Codes for the following P/Ns are:

Flat Key - 6341711: H001  
Flat Key - 6341712: H002  
Flat Key - 6341713: H003  
Flat Key - 6341714: H004  
Flat Key - 6341715: H005  
Flat Key - 6341716: H006  
Flat Key - 6341717: H007  
Flat Key - 6341718: H008  
Flat Key - 6341719: H009  
Flat Key - 5641830: H010  
Tubular Key - 5641800: ----

**Note:** The 3179 is shipped with two keys. Additional keys may be purchased from IBM. Key identification number must accompany each order. Key identification number can be found on the keylock for locks with with flat keys. If the key identification number is unknown, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on a time-and-material basis.

## MACHINE ELEMENTS

Elements can be ordered to provide individual elements as needed by the customer in the use of the 3179.

Order Entry: For shipment, specify Machine Element (P/N) Number at time of order entry.

**Customer Responsibilities:** The customer's responsibilities are the same as those above under "Customer Responsibilities".

**Site Planning and Preparation:** These are the responsibility of the customer. The customer should have on hand, or should order the "IBM 3179 Color Display Station Description Manual", GA18-2177, for site planning and preparation work.

The video, logic, keyboard, pedestal and line cord of the 3179 can be ordered as follows:

- 5954150 Video: Canada, Bermuda
- 5954940 Video: Japan, Korea, Taiwan, Mexico, Bahamas, Dominican Republic, Jamaica, Haiti, Guatemala, Nicaragua, Honduras, Panama, Costa Rica, El Salvador, Guyana, Colombia, Trinidad, Barbados, Venezuela, Netherland-Antilles
- 5954941 Video: Philippines, Burma, Ecuador, Bolivia
- 5954943 Video: Australia, New Zealand
- 5954944 Video: Argentina, Chile, Brunei, Indonesia, Singapore, Malaysia, Sri Lanka, Paraguay, Uruguay
- 5954945 Video: Thailand, Surinam, Peru, Bangladesh, Hong Kong, Afghanistan, Pakistan
- 5954160 Logic: All countries
- 6110616 Keyboard: Canadian French
- 6110617 Keyboard: Katakana
- 6110618 Keyboard: Spanish Speaking
- 6110668 Keyboard: US English
- 5954170 Pedestal: All Countries
- 5640662 Line Cord: Argentina, Brunei, Malaysia, Singapore, Hong Kong
- 5640663 Line Cord: Indonesia
- 5640664 Line Cord: Australia, New Zealand
- 5640668 Line Cord: Chile
- 5640671 Line Cord: Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherland-Antilles, Nicaragua, Panama, Philippines, Taiwan, Trinidad, Tobago, Venezuela
- 5641389 Line Cord: Sri Lanka
- 5640666 Line Cord: Bangladesh, Burma

## SUPPLIES (NONE)

## 3179 COLOR DISPLAY STATION MODEL 2

### PURPOSE

The 3179 Model 2 is a 7-color display station plug compatible with the 5292 Model 1 Color Display Station. It can be used with S/36 and S/38 either directly or through the 5294 Remote Control Unit for entering, editing and displaying alphanumeric data. Displayable colors are red, green, blue, white, yellow, turquoise, and pink. This display station performs the same basic functions as the 5292 Model 1. The 3179 Model 2 displays up to 1,920 characters with 24 lines of 80 characters each. The display station status is shown on a 25th line. Optionally, the user can also display the cursor location (row/column) on this status line. The 3179 Model 2 is offered with no features. (Canada only > (US English only) The 3179 Model 2 is offered in 2 models:

1. Model 200 -- 122-key Typewriter Keyboard
2. Model 220 -- IBM Enhanced Keyboard <)

### MODEL 2

**Model 2 20X:** The language option will be designated by the third character of the WTAAS model number as follows:

- Y US English
- D Canadian French
- K Japanese Katakana
- S Spanish Speaking

(Canada only > **Model 2 220:** For administrative purposes, the Model 220 is designated as Model 22Z when ordered as an optional device as part of the System/36 Total System Package (see M5360 or 5362 pages). <)

**Customer Setup (CSU):** The 3179 Model 2 is designated as a customer setup machine. Setup instructions are included with each machine, as a part of the "IBM 3179 Model 2 Color Display Users Guide", GA18-2387.

(Canada only > **Limitations:** The 3179 Model 220 is not supported on Port 0 with an address of 0, used as a system console. <)

### HIGHLIGHTS

The standard character set includes 96 dot-matrix characters: 52 upper/lowercase alphabetic, 10 numeric, and 33 special characters in addition to 'space'. The display of colors is achieved through the use of already existing attribute codes, and can be used without program modification. (For example, the high intensity attribute code will result in white color; the blink attribute code will result in red color, etc.) For optimum use of color, changes may be desired in existing programs. (See "IBM 3179 Model 2 Color Display Station Programmer's Guide To Using Color", GA18-2389).

Cable-Through with Auto-Termination and Screen Glare Reduction are standard. 188-character Multinational Character Set is available, providing 112 alphabetic, 10 numeric, and 66 special displayable characters. See "Type Catalog" for keyboard layout. Display functions include: Non-display, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. An operator-adjustable audible alarm is provided to alert the operator to special conditions. The low-profile keyboard with adjustable slope and 24 application-assigned command functions provides input and control flexibility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink. The operator can also elect to display the cursor locations (row/column) and screen attribute codes being utilized as well as set the audible alarm volume.

**Operator Factors:** The 3179 Model 2 has an etched screen, which minimizes glare and fingerprints. Status indicators are displayed in symbols on the bottom row of the screen, outside the data area, and

provide useful operator information. An underline type cursor and a rectangular reverse video cursor, with blinking option, are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The 122-key Typewriter Keyboard slope can be adjusted by the user to 6, 12, or 18 degrees. (Canada only > The IBM Enhanced Keyboard can be adjusted by the user to 6 or 12 degrees. <)

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the LOCKED position. These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup and checkout.
4. Determination of required number of spares.
5. Performing CPAR.

Contact IBM Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.

Return security keys to IBM if any exchange service of Logic Element is required. If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on an hourly service basis.

Order the "IBM 3179 Model 2 Color Display Station and Pre-Installation Planning Manual", GA18-2404, for site planning and preparation work since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer be advised to purchase sufficient spare 3179 Model 2 units for such use. The number of spare units is dependent upon the number of 3179 Model 2 units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as individual workstation elements. See "Accessories" for ordering individual elements.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered, or non-IBM parts will be charged for at IBM's then applicable hourly service charges. Altered elements will not be eligible for the exchange or replacement services.

**IBM On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the local IBM service branch office. IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the

customer at the applicable hourly service rates and minimum charge.

Customer-owned spare elements may be installed by IBM to replace defective elements upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is available on an hourly service basis at the applicable hourly rates and terms.

**Keyboards:** (See Notes 1, 2 below)

(Canada only> IBM Enhanced Keyboard, Typewriter-like layout with <) (Canada only> (US English only) 49<) (Canada only> alphanumeric keys, 24 control keys, 12 function keys and 18 numeric pad keys. <)

122-key Typewriter Keyboard: Typewriter-like layout, movable with 49 alphanumeric keys, 31 control keys, 24 command keys, and 18 numeric pad keys.

124-key Japanese Katakana Typewriter Keyboard: Typewriter-like layout, movable. Provides 4-level shift, shift lock, providing 50 data keys and 32 control keys.

**Notes:**

1. Keyboards used on other products are not interchangeable with keyboards used on 3179 Model 2.
2. A coiled keyboard cable is provided with each keyboard.

**Publications:**

- GA18-2404 IBM 3179 Model 2 Color Display Station Introduction and Pre-Installation Planning Manual
- GA18-2389 IBM 3179 Model 2 Color Display Station Programmer's Guide To Using Color
- GA18-2388 IBM 3179 Model 2 Color Display Station Problem Solving Guide (Shipping Group)
- GA18-2387 IBM 3179 Model 2 Color Display Station User's Guide (includes Setup procedure) (Shipping Group)
- SY18-2138 IBM 3179 Model 2 Color Display Station Repair Center Maintenance Information

**Note:** Customers should order the "IBM 3179 Model 2 Color Display Introduction and Pre-Installation Planning Manual", GA18-2404, for site planning and preparation work prior to delivery of the 3179 Model 2.

**SPECIFY**

- Power (100-127V AC, 1-phase, 3-wire, 50-60 Hz or 200-240V AC, 1-phase, 3-wire, 50-60 Hz).
- Power Cord: 2.8m (9 ft) line cord with non-locking plug. The country number of the ordering country determines the default for line cord and shipping group.

**SPECIAL FEATURES (NONE)****MODEL CONVERSIONS (NONE)****ACCESSORIES**

**Cables:** IBM shielded twisted-pair cable, twinaxial cable (or equivalent) is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted-Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Twinaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337.

**Keyboard Overlay:**

(Canada only> For 122-Key typewriter -- 10 blank overlays (P/N 6341703); for IBM Enhanced -- 10 Blank overlays (P/N 6238085) <)

10 overlays (P/N 6341703)

**CUSTOMER REPLACEMENT PARTS**

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

**Field Packaging Material:**

For Video - 6317356  
For Logic - 6316868  
For 122-Key Keyboard - 7342987  
For IBM Enhanced Keyboard - 7342889

**Keys (6342xxx):** (See Note) 3 digits of key code numbers.

**Note:** The 3179 Model 2 is shipped with two keys. Additional keys can be purchased from IBM. Key identification number must accompany each order. If the key identification number is unknown, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis.

**MACHINE ELEMENTS**

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3179 Model 2.

**Order Entry:** For shipment, specify Machine Element (P/N) Number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

**Customer Responsibilities:** The Customer's responsibilities are the same as those above under "Customer Responsibilities".

**Site Planning and Preparation:** These are the responsibility of the customer. The customer should have on hand, or should order the "IBM 3179 Model 2 Color Display Station and Pre-Installation Planning Manual", GA18-2404, for site planning and preparation work.

The video, logic, keyboard, video stand and line cord of the 3179 Model 2 Color Display Station can be ordered as follows:

- 8233436 Video: Canada
- 8233437 Video: Bermuda, Bahamas, Barbados, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Jamaica, Korea, Mexico, Nicaragua, Netherlands-Antilles, Panama, Surinam, Taiwan, Trinidad
- 8233389 Video: Bolivia, Ecuador, Philippines
- 8233440 Video: Afghanistan, Venezuela
- 8233391 Video: Australia, New Zealand
- 8233392 Video: Argentina, Burma, Brunei, Bangladesh, Chile, Hong Kong, Indonesia, Malaysia, Paraguay, Peru, Sri Lanka, Thailand, Uruguay
- 6342810 Logic: All countries
- 1386890 Keyboard - Typewriter: Canadian French
- 1386889 Keyboard - Typewriter: Japanese Katakana
- 1386888 Keyboard - Typewriter: Spanish Speaking
- 1386887 122-Key - Typewriter: US English
- 1390305 IBM Enhanced Typewriter: US English

## MACHINES

M 3179.11  
APR 87  
MAJOR REVISION

- 5954170 Video Stand: All countries
- 5881854 Video Cable: All countries
- 6952353 Line Cord: Brunei, Hong Kong, Malaysia, Singapore
- 6952317 Line Cord: Afghanistan, Indonesia, Surinam
- 6952308 Line Cord: Australia, New Zealand
- 6952371 Line Cord: Chile
- 6952285 Line Cord: Argentina, Paraguay, Uruguay
- 6952297 Line Cord: Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica,

- Japan, Korea, Mexico, Netherlands-Antilles, Nicaragua, Panama, Philippines, Taiwan, Trinidad
- 6952344 Line Cord: Bangladesh, Burma, Sri Lanka
- 6952397 Line Cord: Peru, Thailand, Venezuela
- 6342823 Auto-Termination Unit

## SUPPLIES (NONE)

## 3180 DISPLAY STATION

### PURPOSE

A family of advanced function CRT display stations for use with the S/360, S/370, the 303X, 308X, 3090, 43XX, and 9370 processors via a 3274 or 3276, and 8100 Information Systems, or the S/36, S/38, and the 5294 Remote Control Unit. The 3180 offers a high resolution 15-inch (nominal), monochrome CRT display. The 3180 Model 1 provides selectable multiple screen formats with up to 3,564 alphanumeric characters for entering, retrieving, editing, and displaying data. The 3180 Model 140 is used as the console(s) on the 3090 Processor Complex. A 122-key (124-key for Japanese Katakana) keyboard permits the operator to display and manipulate data on the screen. Depending on model selection, a typewriter-style or APL-style or data entry-style keyboard is provided. The 3180 meets both general-purpose and unique display requirements.

Default order entry schemes allow any available machine configuration to be ordered by model selection. No specify codes are required in most instances. Model 11X, 12X: Attaches in clusters to the 3274 and 3276 for use with the S/360, S/370, 43XX (4321, 4331, 4341, 4361, and 4381), 303X, 308X, 3090, and the 8100 system, attaches to the 4321, 4331, or 4361 via the display/printer adapter, attaches to the 4361 via the Work Station Adapter, or attaches to the 4701 via the Device Cluster Adapter (see "APL" below). Provides four user selectable screen formats.

- Up to 1,920 characters -- 24 lines of 80 characters each
- Up to 2,560 characters -- 32 lines of 80 characters each
- Up to 3,440 characters -- 43 lines of 80 characters each
- Up to 3,564 characters -- 27 lines of 132 characters each

The 3180 Model 140 is used as the console(s) on the 3090 Processor Complex.

**APL:** APL capability is available on Model 13X. APL is supported by an appropriately configured 3274 or 3276, or a 4361 with Work Station Adapter (#2002), or 9370 with Workstation Subsystem Controller (#6020). The 3180 Model 13X with the APL keyboard performs standard data processing functions when not in APL mode.

(Except Japan > Model 21X, 22X: <) (Japan only > Model 20X, 21X: <) Attaches to the 5360, 5362, and 5381 systems units and the 5294 Remote Control Unit. Provides two program selectable screen formats:

- Up to 1,920 characters -- 24 lines of 80 characters each.
- Up to 3,564 characters -- 27 lines of 132 characters each.

Refer to individual system pages for formats supported.

### MODELS

**Model 1:** 11X, 12X, 13X, 140

**Model 2:** (Except Japan > 21X, 22X <)

(Japan only > 20X, 21X <)

**Standard Models:** Standard models are provided for order entry convenience as follows:

(Except Japan > Models 11X and 21X <) (Japan only > 11X and 20X <) consist of the appropriate video element, logic element, a typewriter-style keyboard, cable attachment element, and a 3.0m (9.8 ft) power cord.

(Except Japan > Models 12X and 22X <) (Japan only > Models 12X and 21X <) consist of the appropriate video element, logic element, a data entry-style keyboard, cable attachment element, and a 3m (9.8 ft) power cord.

Model 13X consists of the appropriate video element, logic element, and APL-style keyboard, cable attachment element, and a 3.0m (9.8 ft) power cord.

**Models 140:** The 3180 Model 140 is used as the primary system or service console on the 3090 Processor Complex. A minimum of two consoles are required for each 3090. The console serves as the primary interface for operator interaction with the processor. For maintenance and service support, the console displays the status of the processor complex and is used for interaction with the processor complex by service and support personnel. It is also used for controlling diagnostic tools. The Models 140 will be shipped with the appropriate display element, logic element, console-style keyboard, cable attachment element, and a 3.0m (9.8 ft) line cord.

**Customer Setup (CSU):** The 3180 is designated as a customer setup machine thereby offering the customer early availability and relocation flexibility. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. For additional information on CSU, contact IBM. Not applicable to Console Models 140/145.

**Prerequisites:** For Model 1:

1. One of the following control unit attachments:

3274 with available Category A terminal port

3276 with available port or added #3225, #3256, or #3257

The 3180 Model 1 is only available on the 3276 when emulating a 3278 Model 2-4.

The 3180 Model 130 is available on a 3276 with APL/Text Control feature #1067.

4321 with standard display/printer adapter\*

4331 with standard display/printer adapter or display/printer adapter expansion #2001 on a 4331 Model Group 1 or 2\*

4361 with standard display/printer adapter\* or WSA (Work Station Adapter) #2002

9370 with Workstation Subsystem Controller (#6020).

An available console position on a 3092 processor controller (uses Model 140 only).

4701 with Device Cluster Adapter (#3101)

\* The 3180 Model 1 is only available when emulating a 3278 Model 2.

2. 3274 Configuration Support D (starting with Release Level 63) for program selectable screen format sizes, vertical scrolling, modifiable keyboard, or cursor position indicator functions.

The use of magnetic readers and selector light pen on the 3180 is not supported.

For Model 2: One of the following control unit attachments:

5360  
5362  
5381  
5382  
5294

For any model, the language option will be designated by the third character of the WT AAS model number as follows:

Y	English US
D	Canadian - French
K	Japanese Katakana
S	Spanish Speaking

## MACHINES

**Note:** Specify Model 140 for a console model. This model is available only with US English language.

The country number of the ordering country determines the default for line cord and shipping group.

### HIGHLIGHTS

The 3180 provides display functions compatible with the 3278 Models 2-5 and the 5251 Model 11, advanced display functions, and enhanced ergonomic characteristics including display screen, tilt, rotate, and elevate. The 3180 keyboards consist of 122 keys (124 keys for Japanese Katakana) which includes control and cursor movement keys, 24 program function or command function keys, alphanumeric keys, and numeric pad keys. The keyboard is attached to the display by a pluggable, coiled cable and has three operator selectable slope settings. The keyboard keycaps are removable and, on the Model 1, under 3274 Configuration Support D (Release 63), may be moved about on the keyboard to suit individual desires (with certain restrictions as described in the "IBM 3270 Information Display System Keyboard Utility Users Guide", GA23-0187). Thus, users can create uniquely tailored keyboard layouts (see "Customer Responsibilities").

The Model 1 provides the following operator selectable screen formats:

No. of Lines	24	32	43	27
Chars. Per Line	80	80	80	132
Tot. Data Chars.	1,920	2,560	3,440	3,564
Char. Box Dot	12x18	12x16	12x12	10x16
Matrix				
Char. Dot Matrix	9x11	**	9x8	8x8

\*\* 9x8

The Model 1 provides the following functions:

- 3278 base function
- Operator and program selectable screen formats
- Vertical scrolling
- Record/playback of keystrokes
- Modifiable keyboard
  - (Japan only) > (except Japanese Katakana) <
- Extended highlighting
- Monocase/dual case selection
- Local copy
- Keyboard choice:
  - Typewriter Style
  - Typewriter/APL Style
  - Data entry style
  - Console style (Models 140)
- Keyboard numeric lock selectable
- Adjustable audible alarm
- Security keylock
- Display tilt and rotate
- Display elevate
- Cursor position indicator
- Screen dimming
- Switch control unit (accessory)

The Model 2 provides the following program selectable screen formats:

No. of Lines	24	27
Chars. Per Line	80	132
Tot. Data Chars.	1,920	3,564
Chars.Box Dot	12X18	10X16
Matrix		
Chars. Dot Matrix	9X11	8X8

Refer to individual system pages for formats supported.

The Model 2 provides the following functions:

- 5251-11 function
- Program selectable screen formats
- Record/playback of keystrokes

- Keyboard choice
  - Typewriter style
  - Data entry style
- Adjustable audible alarm
- Security keylock
- Display tilt and rotate
- Display elevate
- Cursor position indicator
- Shadow cursor
- Special text symbols
- Screen dimming
- Multinational character set
- Message line
- Extended country character sets

The 3180 consists of five workstation elements -- display, logic, keyboard, cable attachment, and power cord.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided in "IBM 3180 Display Station User's Guide", (GA21-9468 for Model 1 or GA21-9469 for Model 2). Also, see "Customer Responsibilities".

**Customer Responsibilities:** The customer is responsible for:

- Receipt, unpacking and placement of the 3180.
  - Physical setup, connection of cables to IBM devices incorporating protected access areas, and checkout in accordance with instructions supplied by IBM.
  - Using and following the customer problem analysis and resolution procedures for the 3180 prior to calling for IBM service.
  - Providing a desk or a table top to support the 3180.
  - Installation and maintenance of signal cables and associated parts for interconnecting the 3180(s) and/or attached system or control unit.
  - Returning security keys with the display element if service of the display element is required.
- All modifications made to the standard 3180 keyboard. The customer should remove all special keycaps which are installed on the keyboard prior to submitting a keyboard for exchange or repair, because only keyboards with a standard key layout are available for exchange maintenance.
- Modifying the system configuration specifications when adding additional display stations.
  - Determining quantities and acquiring adequate spares.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3180 elements or machines for such use. The number of spare units is dependent upon the number of 3180 units the customer has installed, application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as complete machines or as individual workstation elements.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable time-and-material charges. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer/Service Rep. On-Site Assistance:** If the customer desires assistance in performing CPAR the local CE branch office may be called for CE/CSR assistance. The CE will respond to

the customer site to aid the customer in performing CPAR procedures using the same documentation that is available to the customer. Customer owned spare Workstation Elements may be installed to replace defective workstation elements by the CE upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is available on a per-call basis at the applicable hourly rates and terms.

## Publications

- "IBM 3180 Model 1 Display Station Introduction and Preinstallation Planning Manual", GA21-9465
- "IBM 3180 Model 2 Display Station Introduction and Preinstallation Planning Manual", GA21-9466
- "IBM 3180 Display Station Model 1 User's Guide", GA21-9468 (shipped with the product)
- "IBM 3180 Display Station Model 2 User's Guide", GA21-9469 (shipped with the product).

For performance considerations of the 3180 Model 1 attached to the 3274, contact IBM.

## SPECIFY

**Default Order Entry:** Specify codes are not required when ordering a 3180. If other codes are not specified, appropriate defaults will be assumed based on the 3-digit country code. Default parameters are shown below for "Specifies".

**Default Order Entry:** See description of Standard Models in "Models". No specify codes are required.

- Color: Shell gray only. No specify code is required.
- Keyboard: One of the following keyboards will be supplied depending on the model ordered. No specify code is required. Note: The price of the keyboard is included in the machine price. Spare keyboard elements may be purchased via P/N. See "Workstation Elements".

Typewriter-style - A 122-key (124 for Japanese Katakana) pluggable keyboard with the EBCDIC character set, typewriter-like layout, movable, with alphameric keys, control keys, and a numeric pad.

Data entry-style - A 122-key (124 for Japanese Katakana) pluggable data entry style keyboard, movable, with alphameric keys, control keys, and blank keys.

- Console -- (will be supplied on the Model 140). No specify code required.) A 122-key pluggable and movable keyboard configured to function as the primary system or service console on the 3090 Processor Complex. Note: This keyboard is available with English language only.

APL--A 122-key (124 for Japanese Katakana) pluggable keyboard with the typewriter-style layout including 81 APL specific characters in addition to the 94 EBCDIC characters. An APL on/off key controls whether the keyboard is in typewriter or APL mode. When emulating a 3278 APL keyboard, PF Keys 13 through 24 duplicate PF 1 through 12. Furnished on Model 13X only.

- Voltage Defaults (AC, 50/60 Hz):

Argentina	#0801	200-240V
Australia	#0801	200-240V
Canada	#0802	100-127V
Colombia	#0802	100-127V
Japan	#0802	100-127V
Mexico	#0802	100-127V
Venezuela	#0802	100-127V

**Note:** If the default voltage is not desired or if a default is not listed for your country, specify desired voltage from the following list:

#0802	100-127V
#0801	200-240V

- Power Cord/Plug Default: A 3.0m power cord with the most commonly used plug for each country as shown in the "IBM 3180 Introduction and Preinstallation Planning Manual", (GA21-9465 for Model 1 or GA21-9466 for Model 2) will be shipped with the machine.
- For Canada and Japan, standard nonlocking plugs will be supplied.  
  
If a standard plug is not listed for your country or is not desired by your customer, specify #2710 for a 50 Hz power cord without a plug or #2746 for a 60 Hz power cord without a plug.
- Cables: See "Accessories" for Model 1 cable or Model 2 cable and associated cable components and ordering instructions.

The following RPQs may be applicable.

Canadian-French keyboard requires the following I/O interface code table in the 3274, 3276, 4321, 4331, or 4361:

Emulation Mode Can.-French  
Native Mode Can.-French Bilingual

3180 Model 2 with Spanish speaking keyboard requires the following control unit/processor RPQs:

	Plant	Field
5360 (Release 2)	8D0255	8D0195
5362	8D0204	N/A
5381 (Release 6)	8D0196	8D0256
5294	8D0194	N/A

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Keys (P/N 2546418):** The 3180 is shipped with two keys for the keylock. Additional keys may be purchased from IBM. Vendor will supply additional keys only to original purchaser. Order additional keys on MES (your plant of manufacture). A letter of authorization with key identification number must accompany each order. Allow 6 to 8 weeks for delivery.

**Note:** If the key identification number is unknown, the display WSE may be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the lock and the keys. This service will be billed on a time-and-material basis.

**User Modifiable Keyboard Accessories:** The following are Model 1 accessories for user modifiable keyboards:

Description	P/N
Blank Keycaps - Light (60 caps plus 1 removal tool)	1351710
Blank Keycaps - Dark (60 caps plus 1 removal tool)	1351728
PF key/87-Key Typewriter Keycaps (2 sets) & removal tool	1351742
Clear Lens Keycaps (60 caps plus 60 light and 60 dark inserts plus 1 removal tool)	6341707
Paper inserts for use with Clear Lens Keycaps (1 set of 150 light & 150 dark)	6341704
Removal Tool (6 tools)	1351717
Blank Keyboard Overlay (10)	6341703

Order parts desired via MES from NDD, Dayton, NJ.

**Switch Control Unit:** (Model 1) Permits switching operational control of 3180 between two different control units. Customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit.

**Warranty:** The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

**Maintenance:** There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available for the switch control unit.

**Ordering Instructions:** This accessory is ordered via MES for field installation only.

One of the following P/Ns should be specified when ordering by MES for field installation.

Language	P/N
Canadian French	2446447
English	2446446
Japanese	2446448
Spanish	2446450

**Model 1 Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

**Coaxial cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3180 Introduction and Preinstallation Planning Manual", GA21-9465. Also, "Coaxial Cable and Associated Manual", GA27-2805. When cabling is ordered from IBM, specify a shipping date 4 weeks in advance of receiving the machine.

Item	Number	Description
Assm	2577672	Cable Assembly In-Door
Bulk	0323921	Coax Wire (Note 1)
P/N	1836418	Connector Kit (Note 1)
Assm	1833108	Cable Assembly Out-Door
Bulk	5252750	Coax Wire (Note 2)
P/N	1836419	Connector Kit (Note 2)
P/N	1833104	Station Protector Kit, Carbon (Note 4)
P/N	2621414	Modification Kit (Note 3)
P/N	1833106	Station Protector Attachment Kit (Note 5)
P/N	5252772	Station Protector Element Carbon (Note 6)
P/N	5252643	Adapter (Note 7)
P/N	1830818	Station Protection Kit, Gas (Note 4)
P/N	5252899	Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

#### Notes:

- Coaxial wire and one connector kit (includes two connectors P/N 1836448) required for each indoor cable assembly.
- Coaxial wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.

- Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
- Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
- Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
- Replacement station protector elements.
- Use to join two P/N 2577672 or two P/N 1833108 cable assemblies together.

**Model 2 Cables:** IBM shielded twisted pair cable (or equivalent) or twinaxial cable is required for product attachment. Cable and associated accessories may be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

**Twinaxial cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3180 Introduction and Preinstallation Planning Manual", GA21-9466. When cable is ordered from IBM, specify a shipping date at least four weeks in advance of receiving the machine.

**Twinaxial Connector Kit:** Includes two connectors. Twinaxial wire and one twinaxial connector kit are required for each attachment cable. Individual connectors are available for replacement purposes. Order as follows:

P/N 7362268	Connector kit for vinyl covered cables
P/N 7362229	Individual connector (replacement) for vinyl covered cables

**Twinaxial Wire:** Order must specify the desired length. Twinaxial wire and one twinaxial connector kit are required for each attachment cable. (Vinyl-covered cable is an indoor/outdoor cable.) Order as follows:

P/N 7362211	For vinyl-covered cables
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**Twinaxial Cable Assembly:** Includes two connectors attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order as follows:

P/N 7362267	Cable assembly with vinyl-coated wire
-------------	---------------------------------------

**Twinaxial Adapter (P/N 7362230):** Permits two twinaxial cable assemblies to be joined together.

**Twinaxial Station Protector Kit (B/M 7361807):** Two protectors. One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual twinaxial station protectors (P/N 7362426) are available for replacement purposes.

#### FIELD PACKAGING MATERIALS

The following parts are available for purchasing by the customer if required. Branch offices should order via parts and supplies requisition.

Description

P/N

Field Packaging Material:

For Display Element	0905193
For Logic Element	0905194
For Keyboard Element	7342558

WORKSTATION ELEMENTS

Workstation Elements may be ordered to provide individual elements as needed by the customer in the use of the 3180.

**3180 Display Station Workstation Elements:** Order Entry: For shipment, specify Machine Element (P/N) at time of order entry.

Workstation elements may be ordered to provide individual elements as needed by the customer in the use of the 3180.

**Customer Responsibilities:** The customer's responsibilities are the same as those listed under "Customer Responsibilities".

**Site Planning and Preparation:** These are the responsibility of the customer. The customer should have on hand, or should order the "IBM 3180 Display Station Introduction and Preinstallation Planning Manual", (GA21-9465 for Model 1 or GA21-9466 for Model 2) for site planning and preparation work.

**Warranty:** Category B

**Maintenance:** Maintenance for individual workstation element is only available on a time-and-material basis at an IBM Repair Center or through an IBM Service/Exchange Center. Minimum charge is applied. Maintenance for workstation element is different by country. Contact Country Service Department for the available maintenance in your country.

Spare display element, logic element, keyboard, cable attachment, and power cord of the 3180 can be ordered as follows:

**Note:** Except for keyboards, the parts listed for Model 1 also apply to Model 140.

To Fit Workstation

Model	Element	P/N*
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1/2	Display	2446783	(Canada-Low Voltage)
1/2	Display	2446784	(All Countries except Canada-Low Voltage)
1/2	Display	2446814	(All Countries -High Voltage)
1/2	Power Cord	2684310	for Canada
		2684647	for Indonesia
		2684463	for Australia/New Zealand/Argentina
		2684644	for Chile
		2684310	for Bahamas/Barbados/Bermuda/Bolivia/Colombia/Costa Rica/Dominican Republic/Ecuador/El Salvador/Guatemala/Guyana/Honduras/Jamaica/Japan/Korea/

1

Logic

1

Logic

1

Logic (APL)

1

Logic (APL)

2

Logic

2

Logic

1

Cable

2

Attach (Coaxial)

2

Cable

1

Attach (Twinaxial)

1

Keyboard (DP)

1

Keyboard (DE)

1

Keyboard (APL)

1

Keyboard (Console)

2

Keyboard (DP)

2

Keyboard (DE)

1

Keyboard (DP)

1

Keyboard (DE)

1

Keyboard (APL)

2

Keyboard (DP)

2

Keyboard (DE)

2684591	Mexico/ Netherland Antilles/ Nicaragua/ Panama/ Philippines/ Taiwan/ Trinidad Tobago/ Venezuela for Hong Kong/ Brunei/ Malaysia/ Singapore
2446724	for Japan (200V)
2446972	(All Countries Except Japanese Katakana)
2446965	(Japanese Katakana)
2456430	(All Countries Except Japanese Katakana)
2456432	(Japanese Katakana)
2446964	(All Countries Except Japanese Katakana)
2446963	(Japanese Katakana)
2446941	All Countries
2446942	All Countries
6110345	(English US-EBCDIC)
6110346	(English US-EBCDIC)
1435036	(English US-EBCDIC)
1435068	(English US)
6110347	(English US-EBCDIC)
6110348	(English US-EBCDIC)
6111022	(Canadian French)
6111025	(Canadian French)
1445749	(Canadian French)
6111070	(Canadian French)
6111075	(Canadian

**MACHINES**

1	Keyboard (DP)	6111023	(French) (Japanese Katakana)
1	Keyboard (DE)	6111026	(Japanese Katakana)
1	Keyboard (APL)	1445757	(Japanese Katakana)
2	Keyboard (DP)	6111072	(Japanese Katakana)
2	Keyboard (DE)	6111077	(Japanese Katakana)
1	Keyboard (DP)	6111024	(Spanish Speaking)
1	Keyboard		

	(DE)	6111027	(Spanish Speaking)
1	Keyboard (APL)	1445753	(Spanish Speaking)
2	Keyboard (DP)	6111073	(Spanish Speaking)
2	Keyboard (DE)	6111078	(Spanish Speaking)

**Note:** Display element does not include a power cord or cable attachment module.

\* Same as bills of material number.

**SUPPLIES (NONE)**

## 3191 DISPLAY STATION MODELS A, B

THERE IS MORE THAN ONE TEXT VERSION FOR THIS PRODUCT

### PURPOSE

A 12-inch cathode-ray tube (CRT) display station used in clusters with the IBM 3174, 3274, the 3276, the 4701 or 4702 Controller, or the 4331 or 4361 Processor with Display Printer Adapter or Workstation Adapter or the 9370 Workstation Subsystem Controller for displaying alphanumeric data, and for entering data into and retrieving data from S/360, S/370, 303X, 308X, 3090, 43XX, 9370 Processor, or 8100 Systems. A keyboard permits an operator to display and manipulate data on the screen. The 3191 meets both general-purpose and unique display requirements.

### MODELS A, B

**Model A1X:** Displays up to 1,920 characters in Green and provides a 122-key Typewriter keyboard (modifiable) or 124-key Japanese Katakana Typewriter keyboard.

**Model B1X:** Displays up to 1,920 characters in Amber-Gold and provides a 104-key Typewriter keyboard (modifiable) or 124-key Japanese Katakana Typewriter keyboard.

**Model A2X:** Displays up to 1,920 characters in Green and provides a 102/103-key IBM Enhanced Typewriter keyboard (104-key Japanese Katakana).

**(Except LAD > Model A3X:** Displays up to 1,920 characters in Green and provides a 104-key Typewriter keyboard (modifiable) or 106-key Japanese Katakana Typewriter keyboard. <)

**Model B2X:** Displays up to 1,920 characters in Amber-Gold and provides a 102/103-key IBM Enhanced Typewriter keyboard (104-key Japanese Katakana).

**(Except LAD > Model B3X:** Displays up to 1,920 characters in Amber-Gold and provides a 104-key Typewriter keyboard (modifiable) or 106-key Japanese Katakana Typewriter keyboard. <)

Language option selected will be designated by the third character of the model number as follows:

- Y US English
- D Canadian Bilingual/French (Not available on Model A2X, B2X, A3X, B3X)
- K Japanese Katakana
- S Spanish Speaking (Not available on Model A2X, B2X, A3X, B3X)

### Prerequisites:

Attachment: Required on Control Unit. For a 3174 or 3274: Available Category A terminal port.

**Note:** If the 3191 is attached to the 3274: The 3191 Models A1X, B1X, A3X, B3X in Native Mode must be attached to 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also required for changing the layout of the IBM 104- or 122-Key Typewriter Keyboard.

The 3191 Models A2X and B2X operate only in Native Mode and must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and 3274 RPQ 7L0825.

3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3191.

3274: RPQ 7L0825 is required to attach Models A2X or B2X, and operates in Native Mode only. (Canadian-French and Spanish-Speaking are not available.)

3276: Available port or added #3255, #3256, or #3257. Allows attachment of 3191 Model A1X, B1X, A3X, B3X in Emulation Mode only.

4361: Standard Display/Printer Adapter or Workstation Adapter allows attachment of 3191 Model A1X or B1X in Emulation Mode only.

4701: Available port on optional DCA adapter. Allows attachment of an 3191 Model A1X or B1X in Emulation Mode only.

4702: Available Port on the DCA adapter. Allows attachment of an 3191 Model A1X or B1X in Emulation Mode only.

**Customer Setup (CSU):** The 3191 is designated as a customer setup machine. Setup instructions (GA18-2458) are included with each machine.

### HIGHLIGHTS

- Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7 X 14 dot matrix in the 9 X 16 contiguous box matrix. Displays a 94 character set: 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters.
- (Canada only > With Canadian Bilingual/French keyboard, displays additional 30 unique Canadian French characters (total 124-character set). <)
- (Japan only > With Japanese Katakana keyboards, displays 127-character set). <)
- The 3191 offers functions equivalent to the 3278 Model 2 or 3178 in Emulation Mode.
- Uses 3270 field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphanumeric, normal/intensified, and displayable/non-displayable.
- The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of the 3191. When the 3191 is attached to a 3174, 3274, 4300 Processor Display Printer Adapter, 4361 Workstation Adapter or 9370 Workstation Subsystem Controller, the printer designation is controlled by operator use of the IDENT key and by: (a) a printer authorization matrix which is loaded into the 3274 through a user-written host application program, or, (b) a customer-definable matrix loaded from the System Diskette at IML time. For further details, see the "IBM 3270 Information Display System Planning and Setup Guide", GA27-2827.
- When the 3191 is attached to a 3276, the printer designation is controlled by operator use of the IDENT Key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276. (The host can perform a copy in a manner compatible with 3271/3272 support.)
- The 3191 consists of three workstation elements (WSEs): Video, logic and keyboard elements.
- Operator Factors: The 3191 has an etched screen, which minimizes glare and fingerprint. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to changed the screen angle for the operator.
- Input Editing Capability: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field,

erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typematic capability. Double speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available.

- When attached to a 3274 with Configuration Support D, or to an 3174, it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 pages for languages supported.
- Security Facilities: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the "on" position.

These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit or actions.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. Physical setup, connection of cables in customer access areas, switch settings and checkout.
4. During initial Setup, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3191.
5. Contacting an IBM customer service coordinator for attachment of the 3191 communications cable to an on-site serviced IBM control unit where customer access area is not provided.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution.
8. Customer is responsible for all modifications he makes to the 3191 keyboard.
9. Customer is responsible for handling any keyboard changes necessary in the event of a maintenance action. That is, the customer should remove all special keycaps prior to submitting a keyboard for exchange. A keyboard with the standard layout will be returned to the customer.
10. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
11. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
12. Each customer must order the "IBM 3191 Display Station Description Manual", GA18-2457, for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3191 units for such use. The number of spare units is dependent upon the number of the 3191 units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase of Maintenance Agreement and repair of that damage or replacement of missing, altered, or non-IBM parts will be charged for at IBM's then-applicable time and materials charges. Altered elements will not be eligible for the exchange or replacement services.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3191 to enhance the availability to the customer. Use of these functions are described in the "Problem Solving Guide" and are designed to be executed by the operator.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the local CE branch office may be called for their assistance. The CE will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer.

Customer-owned spare Workstation Elements (WSE) may be installed to replace defective workstation elements by the CE upon customer request. All on-site assistance is available on a per-call basis at the applicable hourly rates and terms.

#### Keyboards:

- 122-key Typewriter Keyboard (Modifiable) - moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Function keys, and 18 numeric pad keys.
- 124-key Japanese Katakana Typewriter keyboard - Typewriter layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.

Note: Can be used with:

3174

3274 with Configuration Support A, B, C, or D in Emulation Mode.

3274 with Configuration Support D (microcode release 63 or higher) in Native Mode.

3274 with Configuration Support D (microcode release 63 or higher) in Native Mode with modified keytop capability.

- 103-Key IBM Enhanced Keyboard - typewriter-like layout, moveable with 49 alphanumeric keys, 24 control keys, 12 Function keys (24 functions) and 18 numeric pad keys.
- 104-key IBM Enhanced Keyboard (Japanese Katakana - typewriter-like layout, moveable with 49 alphanumeric keys, 25 control keys, 12 Program Function keys (24 functions) and 18 numeric pad keys.

Note: Can only be used with:

3174

3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ 7L0825, in Native Mode. (Canadian-French and Spanish Speaking are not available.)

- (Except LAD) 104-key Typewriter Keyboard (modifiable) - moveable with 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys.

Note: Can be used with:

3174

3274 with Configuration Support A, B, C, or D in Emulation Mode.

3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode.

3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode with modified keytop capability.<)

- 106-key Japanese Katakana Typewriter keyboard - typewriter layout, moveable, provides 4-level shift with 50 data keys and 32 control keys.

Note: Can be used with:

3174

3274 with Configuration Support A, B, C, or D in Emulation Mode.

3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode.

3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode with modified keytop capability.

- Keyboards used on other products are not interchangeable with keyboards used on the 3191.

**Publications:** The following publications are available:

- IBM 3191 Display Station Description (GA18-2457)
- IBM 3191 Display Station User's Guide (GA18-2454)\*
- IBM 3191 Display Station Setup Instructions (GA18-2458)\*
- IBM 3191 Display Station Problem Solving Guide 1 (GA18-2455)\*
- IBM 3191 Display Station Problem Solving Guide 2 (GA18-2456)\*
- IBM 3191 Display Station Repair Center Maintenance Information (SY18-2152)

\* Note: A copy will be shipped with each machine.

## SPECIFY

- Power: 100-127V, 1-phase, 3-wire, 50-60 Hz. A 2.8m (9.0 ft) line cord with non-locking plug.

## SPECIAL FEATURES (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted-pair cable or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted-Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Coaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual" GA27-2805.

The following accessories can be ordered as follows.

- Data Entry Keycaps and Keycap Removal Tool (US English) (P/N 1351741) for Model A10, B10; (LAD only) (P/N 73x3881) for Model A30, B30 (<)
- PF Keycaps for 3178-C20 Typewriter Keyboard Layout (2 sets) and Keycap Removal Tool (US English) (P/N 1351742)
- PF Keycaps for 3178-C30 Typewriter Keyboard Layout (2 sets) and Keycap Removal Tool (US English) (P/N 1391244)
- Blank Keycaps Light (60 caps) and Keycap Removal Tool (P/N 1351710) for Model A10, B10; (LAD only) (P/N 73x3876) for Model A30, B30 (<)
- Blank Keycaps Dark (60 caps) and Keycap Removal Tool (P/N 1351728) for Model A10, B10; (LAD only) (P/N 73x3878) for Model A30, B30 (<)

- Clear Lens Keycaps (60 caps) with Paper Inserts (60 light and 60 dark) and Keycap Removal Tool (P/N 6341707)
- Paper Inserts for Clear Lens Keycaps (150 light and 150 dark) (P/N 6341704) for Model A10, B10; (LAD only) (P/N 73x3886) for Model A30, B30 (<)
- Keycap Removal Tool (6 tools) (P/N 1351717)
- Keyboard Overlay for Extended Select Functions (10 sheets) Model A1X, B1X (P/N 6342112); Model A2X, B2X (P/N 64X9937)
- Blank Keyboard Overlay Model A1X, B1X, A3X, B3X (P/N 6341703); Model A2X, B2X (P/N 6238058)
- Key Blanks for Security Keylock (10)\* for keys labelled A00-A99 (P/N 6238059); for keys labelled D00-D99 (P/N 64X9944)

\* Note: Duplicate keys may be made locally from these key blanks.

Switch Control Unit**	P/N
English	6052157
Japanese	6052160
Canadian French	6052158
Spanish	6052159

\*\* Note: Permits switching operational control of a 3191 between 2 different control units. The customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit. There is no switch control unit designed specifically for the 3191, but use may be made of the unit designed for the 3278 or 3279. The 3279 switch is suggested even though it does not fit readily under the foot of the 3191, since it is better adapted than the 3278 switch to a free-standing installation.

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative

Description	P/N
Field Packaging Material	
For Video	6317356
For Logic	6431983
For Keyboard:	
(122-Key Typewriter)	7342987
(102-Key IBM Enhanced)	7342889
(LAD only)	
(104-Key Typewriter)	69x8207(<)

**Keys:** The 3191 is shipped with two keys. If the keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. As an alternative, security key blanks are available (See Accessories section).

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3191. For shipment, specify Machine Element (P/N) number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

## SITE PLANNING AND PREPARATION

These are the responsibility of the customer. The customer should have on hand, or should order the "IBM 3191 Display Station Description" (GA18-2457) for site planning and preparation work.

The video, logic, keyboard, video stand and line cord of the 3191 Color Display Station can be ordered as follows:

- Video (Green) (P/N 83X7939); Video (Amber-Gold) (P/N 83X7944) -- Bermuda, Bahamas, Barbados, Canada, Colombia, Costa Rica, Dominican Republic, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Japan, Jamaica, Korea, Nicaragua, Netherlands Antilles, Mexico, Panama, Philippines, Surinam, Taiwan, Trinidad
- Video (Green) (P/N 83X7941); Video (Amber-Gold) (P/N 83X7946) -- Bolivia
- Video (Green) (P/N 83X7940); Video (Amber-Gold) (P/N 83X7945) -- China, Hong Kong, Malaysia, Sri Lanka, Afghanistan, Bangladesh, Burma, Venezuela, Thailand
- Video (Green) (P/N 83X7942); Video (Amber-Gold) (P/N 83X7947) -- Chile, Indonesia, New Zealand, Argentina, Australia, Brunei, Peru, Paraguay, Singapore, Uruguay
- Logic (P/N 6238033) -- All countries
- Keyboards:
  - 122-Key Typewriter (P/N 1390242) -- Canadian French
  - 124-Key Typewriter (P/N 1390246) -- Japanese Katakana
  - 122-Key Typewriter (P/N 1390250) -- Spanish Speaking

- 122-Key Typewriter (P/N 1390416) -- New Spanish
- 104-Key Typewriter (P/N 73X3848) -- US - English
- 122-Key Typewriter (P/N 1390238) -- US - English
- IBM Enhanced (P/N 1390123) -- US - English
- 106-Key Typewriter (P/N 73X3854) -- Japanese Katakana
- IBM Enhanced (P/N 1390454) -- Japanese Katakana
- Video Stand (P/N 6238060) -- All countries
- Line Cord (P/N 6952353) -- Brunei, Malaysia, Singapore, Hong Kong
- Line Cord (P/N 6952317) -- Afghanistan, Indonesia, Surinam
- Line Cord (P/N 6952308) -- Australia, New Zealand
- Line Cord (P/N 6952371) -- Chile
- Line Cord (P/N 6952285) -- Argentina, Paraguay, Uruguay
- Line Cord (P/N 6952297) -- Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Taiwan, Trinidad
- Line Cord (P/N 6952344) -- Bangladesh, Burma, Sri Lanka
- Line Cord (P/N 6952397) -- Peru, Thailand, Venezuela

## IBM 3191 DISPLAY STATION MODELS D AND E

### PURPOSE

The 3191 Display Station Models D and E, members of the 3270 Information Display System provide high-quality, 1,920 and 2,560 character, 14-inch monochrome CRT with a smudge-resistant screen which is available in green or amber-gold phosphor. The 3191 Models D and E provide the functions of the 3191 Models A and B as well as the following standard enhancements: Printer Port for local screen copy with screen trim options, Record/Pause/Play capability, Rule and Set-Up Mode. The 3191 Models D and E may be attached to the IBM S/360, S/370, 43XX, 937X, 303X, 308X, 3090, S/8100, S/36 and S/38.

### MODELS

**Model D1X:** Displays up to 2,560 characters on a green monitor and provides a 122-Key Typewriter keyboard (modifiable) (124-Key Japanese Katakana).

**Model E1X:** Displays up to 2,560 characters on an amber-gold monitor and provides a 122-Key Typewriter keyboard (modifiable) (124-Key Japanese Katakana).

**Model D2X:** Displays up to 2,560 characters on a green monitor and provides a 102-key IBM Enhanced Typewriter keyboard (103-Key Thai, 104-Key Japanese Katakana).

**Model E2X:** Displays up to 2,560 characters on an amber-gold monitor and provides a 102-Key Typewriter keyboard (modifiable) (103-Key Thai, 104-Key Japanese Katakana).

**Model D3X:** Displays up to 2,560 characters on a green monitor and provides a 104-key Typewriter keyboard (modifiable) (106-Key Japanese Katakana).

**Model E3X:** Displays up to 2,560 characters on an amber-gold monitor and provides a 104-Key Typewriter keyboard (modifiable) (106-Key Japanese Katakana).

Language option selected will be designated by the third character of the model number as follows:

- Y - English US
- D - Canadian French (Not available on Model D2X, E2X) (Available on D3X, E3X 10/87)
- K - Japanese Katakana
- S - Spanish Speaking (Only available on Model D1X, E1X)
- C - New Spanish (Only available on Model D1X, E1X)
- 0 - Thailand (Only available on Model D2X, E2X)

**Limitations:** For model limitations, see "Prerequisites"

- The following are not available:
  - Magnetic reader control and accessories
  - Monocase switch
  - Selector light pen
  - Video output
- The following items should be taken into consideration when selecting the 3191 keyboard:
  - 122-Key or 104-Key Typewriter Keyboard
    - ▲ Available in Native or Emulation Mode
    - ▲ If keyboard is to be modified: The IBM 3174 (any level) or 3274, Configuration Support D release level 63 or higher is required
  - Available in Native Mode only.
  - 102-Key Enhanced Keyboard

- ▲ Requires a 3174 or Configuration Support D Release Level 65 on 3274 with no-charge RPQ #7L0825.

- ▲ If keyboard is to be modified, the 3174 Release Level 2 is required.

**Prerequisites:** Attachment required on 3174 or 3274 Control Unit available Category A terminal port.

**Note:** If 3191 Models DXX/EXX are attached to a 3274:

- The 3191 Models D1X/E1X and D3X/E3X in Native Mode must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also required for changing the layout of the IBM 122/124-Key Typewriter Keyboard.
- The 3191 Model D2X/E2X operating in Native Mode only, must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and 3274 RPQ 7L0825.
- 3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3191.

(LAD Only> The RPQ #7L0625/#7L0626 is required on 3274 to support the New Spanish (122-Key Typewriter Keyboard) for Latin America.<)

(APG Only> The RPQ #8K1555 is required on 3174 to support the Thai Language (103-Key IBM Enhanced Keyboard).<)

3274 RPQ #7L0825 is required to attach Models D2X/E2X, and operates in Native Mode only.

3276 Available port or added #3255, #3256, or #3257. Allows attachment of Models D1X, E1X, D3X, E3X in Emulation Mode only.

4321 Standard Display/Printer Adapter on 4321. Allows attachment of 3191 Models D1X, E1X, D3X, E3X in Emulation Mode only.

4331 Standard Display/Printer Adapter on the 4331 or Display/Printer Adapter Expansion (2001) on a 4331 Mdl group 1 or 2. Allows attachment of an 3191 Model D1X, E1X, D3X, E3X in Emulation Mode only.

937X Workstation Subsystem Controller allows attachment of 3191 Model D1X or D3X in Emulation Mode only.

4361 Standard Display/Printer Adapter or Workstation Adapter allows attachment of 3191 Model D1X, E1X, D3X, E3X in Emulation Mode only.

**Note:** Spanish Speaking and New Spanish are not available for D2X/E2X or D3X/E3X. Canadian-French is not available for D2X/E2X.

**Customer Setup (CSU):** The 3191 Models D and E are Customer Set-Up (CSU) machines. IBM 3191 Display Station Setup Instructions (GA18-2527) are included with each machine.

### HIGHLIGHTS

- Improved price/performance
  - Low price with discounts for volume procurement
  - 1 or 3 Year Warranty
  - Alert function for maintenance
- Functions
  - Printer Port for local screen copy
  - Screen Margin option
  - Various Print Options selectable at Set-Up time
  - Record/Play/Pause

- Rule
- Set-Up Mode
  - Cursor Speeds selectable
  - Volume Control for Keyboard Click
- Vertical Scroll
- IBM 3270 compatible
- Screen Characteristics
  - Screen Size selectable at Set-Up time
    - 1920 Characters (80 x 24) plus Operator Information Area
    - 2560 Characters (80 x 32) plus Operator Information Area
  - Larger character size than 3178 or 3191 Model A/B
  - Non-glare, 14-inch Green or Amber-Gold monochrome CRT
  - Auto-Dim feature with Time-Out option
  - Row-Column Indicator
- Modifiable Keyboards
  - IBM 122(Japan Only>/124<)-Key Typewriter Keyboard (Except LAD> IBM Enhanced Keyboard (102/103/104-Key)
  - IBM 104/106-Key Typewriter Keyboard <)
  - Coiled keyboard cable
  - Home row indicator keys
- Ergonomics
  - Small, light weight video unit
  - Tilt/Swivel pedestal
  - Small footprint
  - Low-profile keyboards

The 3191-D/E supports the following national languages:

	D1X/ E1X	D2X E2X	D3X E3X
Canadian French	X	-	X
English US	X	X	X
Spanish Speaking	X	-	-
New Spanish	X	-	-
Japanese Katakana	X	X	X
Thailand	-	X	-

## DESCRIPTION

The 3191 Models D and E are a high quality, 1920 or 2560 character, 14-inch Green/Amber-Gold monochrome CRT Display Station used for displaying alphanumeric data, and for entering data into, and receiving data from, the following systems:

SYSTEM	VIA ATTACHMENT
S/360	3274,3276 Type A Adapter
S/370	3274,3276 Type A Adapter
43XX	3174,3274,3276 Type A Adapter
937X	3174,3274 Type A Adapter or Workstation Subsystem Controller
308X	3174,3274,3276 Type A Adapter
3090	3174,3274,3276 Type A Adapter
S/8100	3174,3274 Type A Adapter
303X	3274,3276 Type A Adapter
S/36	3174,3274 Type A Adapter
S/38	3174,3274 Type A Adapter
4321	Display/Printer Adapter
4331	Display/Printer Adapter
4361	Display/Printer or Workstation Adapter

- The 3191 consists of the following workstation elements:

	D1X E1X	D2X E2X	D3X E3X
Video 14" green/ amber-gold	X	X	X
Logic	X	X	X
122-Key Typewriter Kbd.	X		
Enhanced Keyboard		X	
104-Key Typewriter Kbd.			X
Pedestal	X	X	X
Power Cord	X	X	X
Video Cable	X	X	X
Shipping Group	X	X	X

\* Not available in Spanish Speaking or New Spanish

\*\* Not available in Spanish Speaking or New Spanish (available in Canadian-French 10/87.)

- A typewriter style modifiable keyboard with (Except LAD> either 102/103/104 keys on the IBM Enhanced Keyboard or<) 122(APG Only>/124<) keys on the Typewriter Keyboard, provides 24 program function keys, a numeric pad, and cursor-move keys. (Except LAD>Also available is the 104/106-Key Modifiable Typewriter Keyboard (no numeric pad).<)
- A keyboard definition utility is supported in the 3191 to allow definition of customer specific data keyboard layouts. A keycap removal tool is standard so that keycaps can be changed conveniently.
- PA3 key function is supported. To add PA3 nomenclature to the keyboard, use the appropriate Clear Lens Keycaps/Paper Inserts Accessory Kit as listed in the "Accessories" section.
- Printer Port
  - The 4201/4202 (Proprinter) may be attached to the printer port to provide local screen copy. The 3191 Models D and E provide, via set up mode, the ability to select the area of the screen to be printed, as well as the print quality, line density and pitch.
- Rule provides the ability to display the cursor by extending a line both vertically and/or horizontally. This facilitates finding the cursor on a busy screen as well as horizontal and vertical guide for rows and columns.
- Record/Pause/Play provides a method reducing keystrokes by recording and playing back often used data.
- The Response Time Monitor, Alert capability and Entry Assist are supported on the 3274 with Configuration Support D and the IBM 3174.
- Adjustable Audible Alarm, Variable Auto-Dim and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position
- Low-profile keyboards with coiled cable
- Screen Characteristics
  - 14-inch Monochrome CRT provides a bright, steady presentation of either 80 x 24 or 80 x 32 characters
  - Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.
- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.
- Through the use of error indicators, off-line tests and the Customer Problem Solving guide, the customer may isolate a failing element for exchange or replacement.

**Operator Factors:** The 3191-D/E has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to changed the screen angle for the operator. The keyboard slope can be adjusted by the user.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typamatic capability. Double speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available.

When attached to a 3274 with Configuration Support D, or to an IBM 3174, it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3174 or M3274 for languages supported.

**Cabling:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable: For proper identification, installation and application of cable and associated accessories, refer to IBM Cabling System - Planning and Installation Guide, GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

Coaxial Cable - For proper identification, installation and application of cable and associated accessories, refer to IBM 3270 Installation Manual - Physical Planning (GA27-2787) and Coaxial Cable and associated manual (GA27-2805).

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position.

These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see Data Security Controls and Procedures (G320-5649).

## Physical Specifications:

### Video Element

Width: 333mm (13.1 in.)  
Depth: 314mm (12.4 in.)  
Height: 295mm (11.6 in.)  
Weight: 8.5 kg (18.7 lbs.)

### Logic Element

Width: 300mm (11.8 in.)  
Depth: 290mm (11.4 in.)

Height: 47mm (1.9 in.)  
Weight: 1.2 kg (2.6 lbs.)

### Keyboard Element (122-Key)

Width: 561mm (22.1 in.)  
Depth: 230mm (9.1 in.)  
Height: 30mm (1.2 in.)\*  
Weight: 3.0 kg (6.6 lbs.)

### Keyboard Element (102-Key)

Width: 492mm (19.4 in.)  
Depth: 210mm (8.3 in.)  
Height: 30mm (1.2 in.)\*  
Weight: 2.5 kg (5.5 lbs.)

### Keyboard Element (104-Key)

Width: 419mm (16.5 in.)  
Depth: 204mm (8.0 in.)  
Height: 30mm (1.2 in.)\*  
Weight: 1.8 kg (4.0 lbs.)

\* At home row

**Operating Environment:** Operating environment of configurable I/O units are different.

### ● 3191 Models D and E

Class C: 10 to 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent

### ● IBM 4201/4202

Class B: 15.6 to 32.2 degrees C (60 to 90 degrees F);  
Relative Humidity - 20 to 80 percent

## Customer Responsibilities:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial set-up, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the IBM 3191-D/E.
4. Physical set-up, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM service for attachment of the 3191-D/E communications cable to an on-site serviced IBM control unit where customer access area is not provided. This service will be provided at current hourly rates.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR).
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the IBM 3191 Display Station Description Manual (GA18-2666) for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3191-D/E units for such use. The number of spare units is dependent upon the number of the 3191-D/E units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3191-D/E to enhance the availability to the customer. This has been done through routines and procedures in the 3191 Display Station Problem Solving Guide which is used by the customer.

**Publications:** The following publications are available:

- 3191 Display Station Description (GA18-2666)
- 3191 Display Station User's Guide\* (GA18-2526)
- 3191 Display Station Setup Instructions\* (GA18-2527)
- 3191 Display Station Problem Solving Guide\* (GA18-2728)
- IBM Display Station Repair Center Maintenance Information Manual (SY18-2206)

\* A copy is shipped with each machine.

These publications are available from Mechanicsburg.

**Note:** Customers should order the 3191 Display Station Description for site planning and preparation work since this publication is not shipped with each machine. Customers may order the 3191 Display Station Repair Center Maintenance Information (SY18-2206) for repair. The other publications are shipped with the machine.

## SPECIFY

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft) line cord with nonlocking plug. The country number of the ordering country determines the default line for line cord and shipping group.
- The country number of the ordering country determines the default line for line cord and shipping group.

**Keyboards:** The emulation mode which is only available on 122-Key and 104-Key keyboard is provided via 3276, 3274 and 3174. Native mode which is available on all keyboard types. For the modifiable keyboard, native mode is provided via the 3274 Configuration Support D, Release Level 63 or higher and for 102-Key IBM Enhanced Keyboard via 3274 Configuration Support D, Release Level 65 or higher with RPQ #7L0825 on the 3274. All keyboard types are supported native mode by 3174. (Japan Only>The modifiable Katakana keyboard is not supported by 3274 in emulation mode nor in native mode.<)

- 122-Key Typewriter Keyboard (Modifiable) - with 2 angles inclination, moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan Only> 124-key Japanese Katakana Typewriter keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)

Can be used with:

- 3174
- 3274 with Configuration Support A, B, C, or D in Emulation Mode
- 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode
- 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode with modified keytop capability
- IBM 3276, 43XX and 937x in Emulation Mode
- IBM Enhanced Keyboard - Typewriter-like layout, moveable with two angles inclination (Canada Only> 102-key English.<)

- (Japan Only> 104-key Japanese Katakana IBM Enhanced keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and control keys.<)

Can only be used with:

- 3174
- 3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ #7L0825, in Native Mode. (Canadian-French and Spanish Speaking are not available.)
- 104-Key Typewriter Keyboard (modifiable) - moveable with 3 angles of inclination and 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys. The keyboard layout is identical to the IBM 122-key Typewriter Keyboard, but is without the 18-key keypad.
- (Japan Only> 106-Key Japanese KATAKANA Typewriter Keyboard - Typewriter layout, moveable. Provides 4-level shift with 50 data keys, 32 control keys and 24 individual Program Function keys.<)

Can be used with:

- IBM 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support (Microcode release level 63 or higher) in Native Mode.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

### Cables:

Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to IBM Cabling System - Planning and Installation Guide, GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

Coaxial Cable - For proper identification, installation and application of cable and associated accessories, refer to IBM 3270 Installation Manual - Physical Planning, GA-27-2787 and Coaxial Cable and associated manual GA27-2805.

The following accessories can be ordered:

P/N

Switch Control Unit	
English	6052157
Canadian French	6052158
Spanish	6052159
Japanese	6052160

Clear Lens Keycaps/Paper Inserts/Removal Tool	
Mdl D1X/E1X/D2X/E2X	6341707
Model D3X/E3X	73X3878

Blank Keycaps (Light) and Removal Tool for	
Mdl D1X/E1X/D2X/E2X	1351710
Mdl D3X/E3X	73X3878

Blank Keycaps (Dark) and Removal Tool

## MACHINES

Mdl D1X/E1X/D2X/E2X	1351728
Mdl D3X/E3X	73X3877
Keycap Removal Tools (6)	
Mdl D1X/E1X/D2X/E2X	1351717
Mdl D3X/E3X	73X3887
Paper Inserts (150 Light and 150 Dark)	
Mdl D1X/E1X/D2X/E2X	6341704
Mdl D3X/E3X	73X3886
Data Entry Keycap/Keytop Kit (English US)	
Mdl D1X/E1X	1351741
Mdl D3X/E3X	73X3881
APL Keycaps/Keytops (English US) and Removal Tool	
Mdl D1X/E1X	1351711
Mdl D3X/E3X	73X3882
APL Keycaps/Keytops (Japanese Katakana) and Removal Tool	
Mdl D1X/E1X	1351718
Mdl D3X/E3X	73X3885
APL Keycaps (Canadian French) and Removal Tool	
Mdl D1X/E1X	1351726
APL Keycaps (Spanish Speaking) and Removal Tool	
Mdl D1X/E1X	1351727
PF Keycap Kit	
Mdl D1X/E1X/D2X/E2X	1351742
PF/Numeric Keycap Kit	
Mdl D1X/E1X/D2X/E2X	1391244

Blank Keyboard Overlay	
Mdl D1X/E1X/D3X/E3X	6341703
Mdl D2X/E2X	6238058
Keyboard Overlay (English US)	
Mdl D1X/E1X/D3X/E3X	81X4173
Mdl D2X/E2X	81X4194
Keyboard Overlay (French)	
Mdl D1X/E1X	81X4175
Keyboard Overlay (Spanish)	
Mdl D1X/E1X	81X4177
Key Blanks for Security Keylock (10)*	
for keys labelled A00-A99	6238059
for keys labelled D00-D99	64X9944
Printer Cable	6457008

\* Duplicate keys may be made locally from these key blanks.

For local charges, consult your Marketing Representative.

**Keys:** The 3191-D/E is shipped with two keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see "Accessories" or "Supplies".

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3191-D/E.

Order Entry: For shipment, specify Machine Element (P/N) Number at time of order entry.

- Order individual workstation elements through the Telemarketing Representatives.

MACHINE ELEMENT	P/N	COUNTRY
Video (Green)	83X7951	Canada
Video (Amber-Gold)	83X7955	Bahamas, Barbados, Bermuda Jamaica, Surinam, Trinidad Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Taiwan
Video (Green)	83X7953	Bolivia
Video (Amber-Gold)	83X7957	
Video (Green)	83X7954	Argentina, Australia
Video (Amber-Gold)	83X7958	Chile, Indonesia, New Zealand, Paraguay, Peru, Singapore, Uruguay
Video (Green)	83X7943	Afghanistan, Bangladesh,
Video (Amber-Gold)	83X7948	Brunei, Burma, China, Hong Kong, Malaysia, Sri Lanka, Thailand, Venezuela
Logic	81X4733	All Countries except Thailand
Logic	81X4741	Thailand

Keyboard 122-Key	1390702	English US
Keyboard 122-Key	1390703	Canadian French
Keyboard 122-Key	1390705	Spanish Speaking
Keyboard 122-Key	1390717	New Spanish for Latin America
Keyboard 124-Key	1390704	Japanese Katakana
Keyboard 102-Key	1390766	English US
Keyboard 103-Key	1391728	Thailand
Keyboard 104-Key	73X3834	Canadian French
Keyboard 104-Key	1390768	Japanese Katakana
Keyboard 104-Key	73X3832	English US
Keyboard 106-Key	73X3838	Japanese Katakana
Pedestal	94X1857	All Countries
Power Cord	6952297	Bolivia, Bermuda, Ecuador Bahamas, Barbados, Costa Rica, Trinidad Columbia, Guatemala, Dominican Rep., Haiti, Mexico, Netherlands Antilles, Jamaica, El Salvador, Korea, Nicaragua, Japan, Panama, Guyana, Taiwan, Honduras, Canada, Philippines, Surinam
Power Cord	6952308	Australia, New Zealand, China, Argentina, Paraguay, Uruguay
Power Cord	6952317	Afghanistan, Indonesia
Power Cord	6952344	Bangladesh, Burma, Sri Lanka
Power Cord	6952353	Brunei, Malaysia, Singapore Hong Kong
Power Cord	6952371	Chile
Power Cord	6952397	Peru, Thailand, Venezuela

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## 3191 DISPLAY STATION MODEL L

### PURPOSE

The 3191 Display Station Model L, a member of the 3270 Information Display System, provides high-quality, 1920 and 2560 character, 14-inch green monochrome CRT with a smudge-resistant screen. The 3191 Model L provides a Selector Light-pen as well as the following standard functions: Printer Port for local screen copy with screen trim options, Record/Pause/Play capability, Rule and Setup Mode. The 3191 Model L may be attached to the IBM S/360, S/370, 43XX, 937X, 303X, 308X, 3090, S/8100, S/36 and S/38.

### MODEL L

**Model L1X:** 122-Key Typewriter Keyboard, Green Phosphor (14 inch) (124-Key Japanese Katakana)

**Model L2X:** 102-Key IBM Enhanced Keyboard, Green Phosphor (14-inch) (104-Key Japanese Katakana)

**Model L3X:** 104-Key Typewriter Keyboard, Green Phosphor (14-inch) (106-Key Japanese Katakana)

Language option selected will be designated by the third character of the model number as follows:

- Y US English
- D Canadian Bilingual/French (Only available on Model L1x) (Model L3x available 10/87)
- K Japanese Katakana
- S Spanish Speaking (Only available on Model L1X)
- C New Spanish (Only available on Model L1X) material deleted

**Limitations:** For model limitations, see "Prerequisites".

The following are not available:

- Magnetic reader control and accessories
- Monocase switch
- Video output

The following items should be taken into consideration when selecting the IBM 3191 keyboard:

- 122-Key or 104-Key Typewriter Keyboard
  - Available in Native or Emulation Mode.
  - If keyboard is to be modified: The 3174 (any level) or 3274, Configuration Support D release level 63 or higher is required.
- Available in Native Mode only.
- 102-Key Enhanced Keyboard:
  - Requires a 3174 or Configuration Support D Release Level 65 on a 3274 with no-charge RPQ 7L0825.
  - If keyboard is to be modified, the 3174 Release Level 2 is required.

**Prerequisites:** Attachment Required on 3174 or 3274 Control Unit available Category A terminal port.

**Note:** If 3191 Model Lxx is attached to a 3274:

- The 3191 Models L1X and L3X in Native Mode must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also required for changing the layout of the IBM 122-Key Typewriter Keyboard.
- The 3191 Model L2X operating in Native Mode only, must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and IBM 3274 RPQ 7L0825.

3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3191.

(LAD only) The RPQs 7L0625, 7L0626 are required on 3274 to support the New Spanish (122-Key Typewriter Keyboard) for Latin America. <)

3274 RPQ 7L0825 is required to attach Model L2X, and operates in Native Mode only.

3276 Available port or added #3255, #3256, or #3257. Allows attachment of Models L1x or L3x in Emulation Mode only.

937X Workstation Adapter allows attachment of 3191 Model L3x in Emulation Mode only.

Note: Canadian-French available for Model L3x 10/87. Spanish Speaking and New Spanish are not available for L2x or L3x.

**Customer Setup (CSU):** The 3191 Model L is a customer setup (CSU) machine. 3191 Display Station Setup Instructions (GA18-2704) are included with each machine.

### HIGHLIGHTS

- Selector Light-Pen
  - A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. A holder is provided for the Selector Light-Pen while not in use.
- Improved price/performance:
  - Low price with discounts for volume procurement
  - Alert function for maintenance
- Functions:
  - Printer Port for local screen copy:
    - ▲ Screen Margin option
    - ▲ Various Print Options selectable at setup time
  - Record/Play/Pause
  - Rule
  - Setup Mode:
    - ▲ Cursor Speeds selectable
    - ▲ Volume Control for Keyboard Click
  - Vertical Scroll
- Compatibility (See "Compatibility and Migration" section for details):
  - IBM 3270 compatible
- Screen Characteristics:
  - Screen Size selectable at Setup time
    - ▲ 1,920 Characters (80 x 24) plus Operator Information Area
    - ▲ 2,560 Characters (80 x 32) plus Operator Information Area
  - Larger character size than 3178 or 3191 Model A/B
  - Non-glare, 14-inch Green monochrome CRT
  - Auto-Dim feature with Time-Out option
  - Row-Column Indicator
- Modifiable Keyboards:
  - IBM 122-Key Typewriter Keyboard
  - (Except LAD) IBM Enhanced Keyboard (102-Key)
  - IBM 104-Key Typewriter Keyboard <)
  - Coiled keyboard cable
  - Home row indicator keys
- Ergonomics:
  - Small, light weight video unit
  - Tilt/Swivel pedestal
  - Small footprint

- Low-profile keyboards

The 3191-L supports the following national languages:

	3191-L1x	3191-L2x	3191-L3x
Canadian			
French	X	-	*
Spanish			
Speaking	X	-	-
New Spanish	X	-	-
Japanese			
Katakana	X	X	X

\* Canadian French available 10/87

#### Physical Specifications:

##### Video Element:

Width: 333mm (13.1 in.)  
Depth: 314mm (12.4 in.)  
Height: 295mm (11.6 in.)  
Weight: 8.5kg (18.7 lbs.)

##### Logic Element:

Width: 300mm (11.8 in.)  
Depth: 290mm (11.4 in.)  
Height: 47mm (1.9 in.)  
Weight: 1.2kg (2.6 lbs.)

##### Keyboard Element (122-Key)

Width: 561mm (22.1 in.)  
Depth: 230mm (9.1 in.)  
Height: 30mm (1.2 in.)\*  
Weight: 3.0kg (6.6 lbs.)

##### Keyboard Element (102-Key):

Width: 492mm (19.4 in.)  
Depth: 210mm (8.3 in.)  
Height: 30mm (1.2 in.)\*  
Weight: 2.5kg (5.5 lbs.)

##### Keyboard Element (104-Key):

Width: 419mm (16.5 in.)  
Depth: 204mm (8.0 in.)  
Height: 30mm (1.2 in.)\*  
Weight: 1.8kg (4.0 lbs.)

\* at home row

**Operating Environment:** Operating environment of configurable I/O units are different.

##### 3191 Model L:

Class C: 10 - 40.6C (50-105F); 8-80% Relative Humidity

##### 4201/4202:

Class B: 15.6 - 32.2C (60-90F); 20-80% Relative Humidity

#### Publications:

- GA18-2700 IBM 3191 Display Station Description
- GA18-2702 IBM 3191 Display Station User's Guide\*
- GA18-2704 IBM 3191 Display Station Setup Instructions\*
- GA18-2708 IBM 3191 Display Station Problem Solving Guide\*
- SY18-2221 IBM 3191 Display Station Repair Center Maintenance Information

\* A copy will be shipped with each machine.

**Note:** Customers should order the "IBM 3191 Display Station Description" for site planning and preparation work since this publication is not shipped with each machine. Customers may order the

"IBM 3191 Display Station Repair Center Maintenance Information", SY18-2221, for repair. The other publications are shipped with the machine.

#### DESCRIPTION

The 3191 Model L is a high quality, 1,920 or 2,560 character, 14-inch Green monochrome CRT Display Station that provides a Selector Light-Pen and is used for displaying alphanumeric data, and for entering data into and receiving data from the following systems:

System	via Attachment
S/360	3274,3276 Type A Adapter
S/370	3274,3276 Type A Adapter
43XX	3174,3274,3276 Type A Adapter*
937X	3174,3274 Type A Adapter
	or Workstation Adapter
308X	3174,3274,3276 Type A Adapter
3090	3174,3274,3276 Type A Adapter
S/8100	3174,3274 Type A Adapter
303X	3274,3276 Type A Adapter
S/36	3174,3274 Type A Adapter
S/38	3174,3274 Type A Adapter

\* The 3191-L does not attach to the 43X1 Workstation Adapter or DPA.

- The 3191 consists of the following workstation elements:

	Models		
	L1x	L2x*	L3x**
Video 14-inch			
green monochrome	X	X	X
Logic	X	X	X
Selector Light-Pen	X	X	X
IBM 122-Key			
Typewriter Keyboard	X		
IBM Enhanced Keyboard		X	
IBM 104-Key Typewriter			
Keyboard			X
Pedestal	X	X	X
Power Cord	X	X	X
Shipping Group	X	X	X

\* Not available in Canadian French, Spanish Speaking or New Spanish.

\*\* Not available in Spanish Speaking or New Spanish. Available in Canadian-French 10/87.

- A typewriter style modifiable keyboard with either (Except LAD> 102/104 keys on the IBM Enhanced Keyboard<) or 122(A/PG only> /124<) keys on the Typewriter Keyboard, provides 24 program function keys, a numeric pad, and cursor-move keys. (Except LAD> Also available is the 104/106-Key Modifiable Typewriter Keyboard (no numeric pad).<)

A keyboard definition utility is supported in the 3191 to allow definition of customer specific data keyboard layouts. A keycap removal tool is standard so that keycaps can be changed conveniently.

- PA3 key function is supported. To add PA3 nomenclature to the keyboard, use the appropriate Clear Lens Keycaps/Paper Inserts Accessory Kit as listed under the "Accessories" section.

- Printer Port:

- The 4201/4202 (Proprinter) may be attached to the printer port to provides local screen copy. The 3191 Model L provides, via set up mode, the ability to select the area of the screen to be printed, as well as the print quality, line density and pitch.

- Rule provides the ability to display the cursor by extending a line both vertically and/or horizontally. This facilitates finding the cursor on a busy screen as well as horizontal and vertical guide for rows and columns.
- Record/Pause/Play provides a method reducing keystrokes by recording and playing back often used data.
- The Response Time Monitor, Alert capability and Entry Assist are supported on the 3274 with Configuration Support D and the 3174.
- Adjustable Audible Alarm, Variable Auto-Dim and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position.
- Low-profile keyboards with coiled cable.
- Screen Characteristics:
  - 14-inch Green monochrome CRT provides a bright, steady presentation of either 80 x 24 or 80 x 32 characters.
  - Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.
- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.
- Through the use of error indicators, off-line tests and the Customer Problem Solving guide, the customer may isolate a failing element for exchange or replacement.

**Operator Factors:** The 3191-L has an etched screen, which minimizes glare and fingerprint. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provides useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to changed the screen angle for the operator. The keyboard slope can be adjusted by the user.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typematic capability. Double-speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available.

When attached to a 3274 with Configuration Support D, or to a 3174, it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3174 or 3274 pages for languages supported.

**Cabling:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

- IBM Shielded Twisted-Pair Cable: For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.
- Coaxial Cable - For proper identification, installation and application of cable and associated accessories, refer to "IBM

3270 Installation Manual - Physical Planning", GA27-2787 and Coaxial Cable and associated manual, GA27-2805.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the LOCKED position.

These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures" (G320-5649).

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial setup, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3191-L.
4. Physical setup, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM service for attachment of the 3191-L communications cable to an on-site serviced IBM control unit where customer access area is not provided. This service will be provided at current hourly rates.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR).
8. Contacting IBM CE Branch Office if IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "IBM 3191 Display Station Description Manual", GA18-2700 for site planning and preparation work, since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3191-L units for such use. The number of spare units is dependent upon the number of the 3191-L units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3191-L to enhance the availability to the customer. This has been done through routines and procedures in the 3191 Display Station Problem Solving Guide which is used by the customer.

## SPECIFY

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz or 200-240V AC, 1-phase, 3-wire, 50-60 Hz
- Line Cord: A 2.8m (9.0 ft.) line cord with non-locking plug. The country number of the ordering country determines the default line for line cord and shipping group.
- The country number of the ordering country determines the default line for line cord and shipping group.

**Keyboards:** The emulation mode which is only available on 122-Key and 104-Key keyboard is provided via 3276, 3274, and 3174. Native mode which is available on all keyboards types. For the modifiable keyboard, native mode is provided via the 3274 Configuration Support D, Release Level 63 or higher, and for 102-Key IBM Enhanced Keyboard via 3274 Configuration Support D, Release Level 65 or higher with RPQ 7L0825 on the 3274. All keyboard types are supported native mode by 3174. (Japan only) The modifiable Katakana keyboard is not supported by 3274 in emulation mode or in native mode. < >

- 122-Key Typewriter Keyboard (Modifiable) - with 2 angles inclination, Moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan only) 124-key Japanese Katakana Typewriter keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys. < >

Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- IBM 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode.
- IBM 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode with modified keytop capability.
- IBM 3276 and 937X in Emulation Mode.
- IBM Enhanced Keyboard - Typewriter-like layout, moveable with 2 angles inclination. (Canada only) (102-key English) < >
- (Japan only) 104-key Japanese Katakana IBM Enhanced keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys. < >

Can only be used:

- IBM 3174.
- IBM 3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ 7L0825, in Native Mode. (Canadian-French and Spanish Speaking are not available.)
- 104-Key Typewriter Keyboard (modifiable) - moveable with 3 angles of inclination and 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys. The keyboard layout is identical to the IBM 122-key Typewriter Keyboard, but is without the 18-key keypad.
- (Japan only) 106-Key Japanese Katakana Typewriter Keyboard - Typewriter layout, moveable. Provides 4-level shift with 50 data keys, 32 control keys and 24 individual Program Function keys. < >

Can be used with:

- IBM 3174
- IBM 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- IBM 3274 with Configuration Support (Microcode release level 63 or higher) in Native Mode.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The following accessories can be ordered:

- Switch Control Unit English (P/N 6052157)
- Switch Control Unit Canadian/French (P/N 6052158)
- Switch Control Unit Spanish (P/N 6052159)

- Switch Control Unit Japanese (P/N 6052160)
- Clear Lens Keycaps/Paper Inserts/Removal Tool for Models L1x, L2x (P/N 6341707)
- Clear Lens Keytops/Paper Inserts/Removal Tool for Model L3x (P/N 73X3878)
- Blank Keycaps (Light) and Removal Tool for Models L1x, L2x (P/N 1351710)
- Blank Keytops (Light) and Removal Tool for Model L3x (P/N 73X3876)
- Blank Keycaps (Dark) and Removal Tool for Models L1x, L2x (P/N 1351728)
- Blank Keytops (Dark) and Removal Tool for Model L3x (P/N 73X3877)
- Keycap Removal Tools (6) for Models L1x, L2x (P/N 1351717)
- Keytop Removal Tools (6) for Model L3x (P/N 73X3887)
- Paper Inserts (150 Light and 150 Dark) for Models L1x, L2x (P/N 6341704)
- Paper Inserts (150 Light and 150 Dark) for Model L3x (P/N 73X3886)
- Data Entry Keycap/Keytop Kit (US English) for: Model L1x (P/N 1351741); Model L3x (P/N 73X3881)
- APL Keycaps/Keytops (US English) and Removal Tool for: Model L1x (P/N 1351711); Model L3x (P/N 73X3882)
- APL Keycaps/Keytops (Japanese Katakana) and Removal Tool for: Model L1x (P/N 1351718); Model L3x (P/N 73X3885)
- APL Keycaps (Canadian French) and Removal Tool for: Model L1x (P/N 1351726)
- APL Keycaps (Spanish Speaking) and Removal Tool for: Model L1x (P/N 1351727)
- PF Keycap Kit for Models L1x, L2x (P/N 1351742)
- PF/Numeric Keycap Kit for Models L1x, L2x (P/N 1391244)
- Blank Keyboard Overlay for: Model L3x (P/N 6341703; Model L2x (P/N 6238058)
- Keyboard Overlay (US English) for: Models L1x, L3x (P/N 81X4173); Model L2x (P/N 81X4194)
- Keyboard Overlay (French) for: Model L1x (P/N 81X4175)
- Keyboard Overlay (Spanish) for: Model L1x (P/N 81X4177)
- Key Blanks for Security Keylock (10)\* for keys labelled A00-A99 (P/N 6238059); for keys labelled D00-D99 (P/N 64X9944)
- Printer Cable (P/N 6457008)

For local charges, consult your Marketing Representative.

**Keys:** The 3191-L is shipped with 2 keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center. This service is available on an hourly service basis. For additional/replacement keys, see "Accessories".

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3191-L.

**Order Entry:** For shipment, specify Machine Element (P/N) Number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

**Site Planning and Preparation:** Planning is the responsibility of the customer. The customer should have on hand, or should order the "IBM 3191 Display Station Description Manual", GA18-2700 for site planning and preparation work.

The video, logic, keyboard, pedestal, selector light-pen, and line cord of the 3191-L Display Station can be ordered as follows:

- Video (Green), P/N 83X7951

Bermuda, Bahamas, Barbados, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Surinam, Taiwan, Trinidad, US, Canada:

- Video (Green), P/N 83X7953 (Bolivia)
- Video (Green), P/N 83X7954:

Argentina, Australia, Chile, Indonesia, New Zealand,  
Paraguay, Peru, Singapore, Uruguay

- Video (Green), P/N 83X7943:

Afghanistan, Bangladesh, Brunei, Burma, China, Hong  
Kong, Malaysia, Sri Lanka, Thailand, Venezuela

- Logic, P/N 81X7943 (All Countries)
- Keyboard 122-Key, P/N 1390702 (US English)
- Keyboard 122-Key, P/N 1390703 (Canadian/French)
- Keyboard 122-Key, P/N 1390705 (Spanish Speaking)
- Keyboard 122-Key, P/N 1390717 (New Spanish for Latin America)
- Keyboard 124-Key, P/N 1390704 (Japanese Katakana)
- Keyboard 102-Key, P/N 1390766 (US English)
- Keyboard 104-Key, P/N 1390768 (Japanese Katakana)
- Keyboard 106-Key, P/N 73x3838 (Japanese Katakana)
- Keyboard 104-Key, P/N 73x3832 (US English)
- Keyboard 104-Key, P/N 73X3834 (Canadian French)
- Pedestal, P/N 94X1857 (All Countries)
- Power Cord, P/N 6952297

Bolivia, Bermuda, Ecuador, Bahamas, Barbados, Costa  
Rica, Trinidad, Colombia, Guatemala, Dominican Re-  
public, Haiti, Mexico, Netherlands Antilles, Jamaica, El  
Salvador, Korea, Nicaragua, Japan, Panama, Guyana,  
Taiwan, Honduras, Canada, Philippines, Surinam

- Power Cord, P/N 6952308:

Australia, New Zealand, China, Argentina, Paraguay,  
Uruguay

- Power Cord, P/N 6952317 (Afghanistan, Indonesia)
- Power Cord, P/N 6952344 (Bangladesh, Burma, Sri Lanka)
- Power Cord, P/N 6952353 (Brunei, Malaysia, Singapore, Hong Kong)
- Power Cord, P/N 6952371 (Chile)
- Power Cord, P/N 6952397 (Peru, Thailand, Venezuela)
- Selector Light-pen, P/N 94X1847 (All Countries)

SUPPLIES (NONE)

## 3192 DISPLAY STATION MODEL C

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 3192 Model C Color Display Station, is the newest color display in the 3270 Information Display System. The 3192 Model C provides high quality, 1920- or 2,560-character, 14-inch 7-color CRT with smudge-resistant screen. The 3192 Models C replaces and provides the functions of the 3179-1 as well as the following standard enhancements:

- Printer Port for local screen copy with screen trim options
- Record/Pause/Play capability
- Rule
- Setup Mode
- Choice of keyboard and lower price.

The 3192 may be attached to the S/360, S/370, 43xx, 303x, 308x, 3090, S/8100, S/36 and S/38.

### MODEL C

**Model C1X:** Displays up to 2,560 characters on a 7-color monitor and provides 122 (APG only > /124 <) -Key Typewriter Keyboard.

**Model C2X:** Displays up to 2,560 characters on a 7-color monitor and provides 102-Key IBM Enhanced Typewriter Keyboard (104-key Japanese Katakana).

**Model C3X:** Displays up to 2,560 characters on a 7-color monitor and provides 104-Key Typewriter Keyboard (106-key Japanese Katakana).

Language option selected will be designated by the third character of the model number as follows:

- Y English US
- D Canadian French (Not available on Model C2X, C3X)
- K Japanese Katakana
- S Spanish Speaking (Not available on Model C2X, C3X)
- C New Spanish (Not available on Model C2X, C3X)
- O Thailand (Not available on Model C1X, C3X)

**Limitations:** For model limitations, see Prerequisites.

The following are not available:

- Magnetic reader control and accessories
- Monocase switch
- Selector light-pen
- Video output

The following items should be taken into consideration when selecting the 3192 keyboard:

- 122-Key or 104-Key Typewriter Keyboard  
Available for the 3276, 43XX and 3274 with Configuration Support A, B, or C. For the 3274, Configuration Support D Release Level 63s required.
- 102-Key Enhanced Keyboard  
Requires Configuration Support D Release Level 65 on the 3274 with no-charge RPQ 7L0825.

**Prerequisites:** Attachment required on the 3174 or 3274 Control Unit (available Category A terminal port).

**Note:** If a 3192 Model C is attached to a 3274:

- The 3192 Models C10 and C30 in Native Mode must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also re-

quired for changing the layout of the IBM 122-Key Typewriter Keyboard.

- The 3192 Model C20, operating in Native Mode only, must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and 3274 RPQ 7L0825.
- 3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3192 Model C.

(LAD only > The RPQ 7L0625/7L0626 is required on 3274 to support the New Spanish (122-Key Typewriter) Keyboard for Latin America. <)

(APG only > The RPQ 8K1555 is required on 3174 to support the Thai Language (103-Key IBM Enhanced Keyboard). <)

3274 RPQ 7L0825 is required to attach Models C2X and operates in Native Mode only.

3276 available port or added #3255, #3256, or #3257. Allows attachment of Model C1X, C3X in Emulation Mode only.

4321 Standard Display/Printer Adapter on 4321. Allows attachment of 3192 Model C1X, C3X in Emulation Mode only.

4331 Standard Display/Printer Adapter on the 4331 or Display/Printer Adapter Expansion (#2001) on a 4331 Model Group 1 or 2. Allows attachment of a 3192 Model C1X or C3X in Emulation Mode only.

937X Workstation Adapter allows attachment of a 3192 Model C1X or C3X in Emulation Mode only.

4361 Standard Display/Printer Adapter or Workstation Adapter allows attachment of 3192 Model C1X or C3X in Emulation Mode only.

**Note:** Canadian French, Spanish Speaking and New Spanish are not available for C2X or C3X.

**Customer Setup (CSU):** The 3192 Model C is a customer setup (CSU) machine. Setup instructions are included with each machine as "IBM 3192 Model C Color Display Station Setup Instructions", GA18-2533.

### HIGHLIGHTS

- Improved price/performance
  - Low price with discounts for volume procurement
  - 36-month warranty
  - Alert function for maintenance
- Functions
  - Printer Port for local screen copy
    - ▲ Screen Margin option
    - ▲ Various Print Options selectable at setup time
  - Record/Play/Pause
  - Rule
  - Setup Mode
    - ▲ Cursor Speeds selectable
    - ▲ Volume Control for Keyboard Click
  - Vertical Scroll
- Compatibility
  - 3270 compatible
- Screen Characteristics (Model C)
  - Screen size selectable at setup time
    - ▲ 1,920 Characters (80 x 24) plus Operator Information Area
    - ▲ 2,560 Characters (80 x 32) plus Operator Information Area
  - Non-glare, 14-inch, 7-color CRT with Steady Image
  - Extended Highlighting
  - Auto-Dim feature with Time-out option
  - Row-Column Indicator
- Keyboard
  - 122-Key Typewriter Keyboard (Modifiable)
  - (Except LAD > 102-Key IBM Enhanced Keyboard)

- 104-Key Typewriter Keyboard (Modifiable) (<)
- Coiled keyboard cable
- Home row indicator keys
- Ergonomics
  - Smaller, lighter weight video unit
  - Tilt/Swivel pedestal
  - Small footprint
  - Low-profile keyboards

The 3192 Model C supports the following national languages:

## DESCRIPTION

The 3192 Model C is a high quality, 1,920- or 2,560-character, 14-inch, 7-color CRT display station used for displaying alphanumeric data, and for entering data into, and receiving data from, the following systems:

### System via Attachment

S/360	3274, 3276	Type A Adapter
S/370	3274, 3276	Type A Adapter
43xx	3174, 3274, 3276	Type A Adapter
937x	3174, 3274	Type A Adapter or Workstation Adapter
308x	3174, 3274, 3276	Type A Adapter
3090	3174, 3274, 3276	Type A Adapter
S/8100	3174, 3274	Type A Adapter
303x	3274, 3276	Type A Adapter
S/36	3174, 3274	Type A Adapter or
	5209 3270-5250	Link Protocol Converter
S/38	3174, 3274	Type A Adapter or
	5209 3270-5250	Link Protocol Converter
4321	Display/Printer	Adapter
4331	Display/Printer	Adapter
4361	Display/Printer	or Workstation Adapter

The 3192 consists of the following workstation elements:

	Models		
	C1x	C2x*	C3x*
Video 14-inch Color	X	X	X
Logic	X	X	X
IBM 122-Key Typewriter Keyboard	X		
IBM Enhanced Keyboard		X	
IBM 104-Key Typewriter Keyboard			X
Pedestal	X	X	X
Power Cord	X	X	X
Video Cable	X	X	X
Shipping Group	X	X	X

\* Not available in Canadian French, Spanish Speaking or New Spanish.

- A typewriter style keyboard with either (Except LAD> 102/104 modifiable keys on the IBM Enhanced Keyboard<) or 122(APG only>/124<) (modifiable) keys on the Typewriter Keyboard, provides 24 program functions, a numeric pad, and cursor-move keys. (Except LAD> Also available is the 104/106-Key Modifiable Typewriter Keyboard (no numeric pad).<)

A keyboard definition utility is supported in the 3192 to allow definition of customer specific (Except LAD> 104/106<) or 122/(APG only>/124<)-key data keyboard layouts. A keycap

removal tool is standard so that keycaps can be changed conveniently.

### Printer Port

- The 4201/4202 (Proprinter) may be attached to the printer port to provide local screen copy. The 3192 provides, via setup mode, the ability to select the area of the screen to be printed, as well as the print quality, line density and pitch.

- Rule provides the ability to display the cursor by extending a line both vertically and horizontally. This facilitates finding the cursor on a busy screen as well as horizontal and/or vertical guide for rows and columns.
- Record/Pause/Play provides a method reducing keystrokes by recording and playing back often-used data.
- The Response Time Monitor, Alert, and Entry Assist capabilities are supported on the 3274 with Configuration Support D and the 3174.
- Adjustable Audible Alarm, Variable Auto-dim, and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position.
- Low-profile keyboards with coiled cable.
- Screen Characteristics
  - 14-inch 7-color CRT provides a bright, steady presentation of either 80 x 24 or 80 x 32 characters.
  - Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.
- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.
- Through the use of error indicators, off-line tests and the Customer Problem Solving guide, the customer may isolate a failing element for repair or replacement.
- Operator Factors: The 3192 Model C has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to changed the screen angle for the operator. The keyboard slope can be adjusted by the user.
- Input Editing Capability: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typamatic capability. Double speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available. When attached to a 3274 with Configuration Support D, or to a 3174, it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3174 or 3274 pages for languages supported.
- Cabling: IBM shielded twisted pair cable or coaxial cable is required for product attachment. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to the "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

Coaxial Cable - For proper identification, installation and application of cable and associated accessories, refer to the "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and Coaxial Cable and Associated Manual", GA27-2805.

- **Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position. These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions. User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

**Physical Specifications:****Video Element**

Width - 383mm (15.1 inches)  
Depth - 405mm (15.9 inches)  
Height - 345mm (13.6 inches)  
Weight - 12.7kg (28.0 pounds)

**Logic Element**

Width - 300mm (11.8 inches)  
Depth - 290mm (11.4 inches)  
Height - 47mm (1.9 inches)  
Weight - 1.2kg (2.6 pounds)

**Keyboard Element - 122-Key**

Width - 561mm (22.1 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 3.0kg (6.6 pounds)  
(Except LAD>

**Keyboard Element - 102-Key**

Width - 492mm (19.4 inches)  
Depth - 210mm (8.3 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 2.5kg (5.5 pounds)

**Keyboard Element - 104-Key**

Width - 419mm (16.5 inches)  
Depth - 204mm (8.0 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 1.8kg (4.0 pounds)<)

\* At Home Row.

**Operating Environment:**

Operating environment of configurable I/O units are different.

- **3192 Model C Class C:**  
Temperature - 10 - 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent
- **4201, 4202 Class B:**  
Temperature - 15.6 - 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity - 20 to 80 percent

**Customer Responsibilities:**

The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial setup, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3192 Model C.
4. Physical setup, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM service for attachment of the 3192 Model C communications cable to an on-site serviced IBM control unit where customer access area is not provided.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR)
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "IBM 3192 Display Station Description Manual", GA18-2544 for site planning and preparation work since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3192 Model C units for such use. The number of spare units is dependent upon the number of the 3192 Model C units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3192 Model C to enhance the availability to the customer. This has been done through routines and procedures in the "IBM 3192 Model C Color Display Station Problem Solving Guide" which is used by the customer.

**Keyboards:** The emulation mode, which is only available on 122-key and 104-key keyboard is provided via 3174, 3274 and 3276. Native mode is available on all keyboard types. For the modifiable keyboard, native mode is provided via the 3274 Configuration Support D, Release Level 63 or higher and for 102-key IBM Enhanced Keyboard via 3274 Configuration Support D, Release Level 65 or higher with RPQ 7L0825 on the 3274. All keyboard types are supported native mode by 3174. (Japan only> The modifiable Katakana keyboard is not supported by 3274 in emulation mode nor in native mode.<)

- 122-key Typewriter Keyboard - with 2 angles inclination moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys. (Japan only> 124-key Japanese Katakana Typewriter Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode with modified keytop capability.
- 3276, 43XX, and 937X in Emulation Mode.
- IBM Enhanced Keyboard - Typewriter-like layout, moveable with 2 angles inclination (Canada only> 102-key English<).

(Japan only) 104-Key Japanese Katakana IBM Enhanced Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys. <)

**Note:** Can only be used with:

- 3174.
- 3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ 7L0825, in Native Mode. (Canadian French and Spanish Speaking are not available.)
- 104-Key Typewriter Keyboard - moveable with 3 angles of inclination and 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys. The keyboard layout is identical to the IBM 122-Key Typewriter Keyboard, but is without the 18-key keypad.
- (Japan only) 106-Key Japanese Katakana Typewriter Keyboard - typewriter layout, moveable. Provides 4-level shift with 50 data keys, 32 control keys and 24 individual Program Function keys. <)

**Note:** Can be used with:

- 3174
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode.

**Publications:** The following publications are available:

- GA18-2532 IBM 3192-C Display Station User's Guide\*
- GA18-2533 IBM 3192-C Display Station Setup Instructions\*
- GA18-2534 IBM 3192-C Display Station Problem Solving Guide\*
- GA18-2535 IBM 3192 Display Station Description,
- SY18-2174 IBM 3192 Display Station Repair Center Maintenance Information

\* A copy will be shipped with each machine.

The countries will print translated ship group documentation. Countries without translation centers (such as Austria and Switzerland) must request translated ship group documentation from the appropriate translation centers. The country Distribution Center will merge the translated documents with the hardware. Manufacturing will print non-translated ship group documentation and include it with the hardware (business as usual).

These publications are available immediately from Mechanicsburg.

**Note:** Customers should order the "IBM 3192 Display Station Description" for site planning and preparation work since this publication is not shipped with each machine. Customers may order the "IBM 3192 Display Station Repair Center Maintenance Information", SY18-2174, for repair. The other publications are shipped with the machine.

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz. or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft.) line cord with non-locking plug. The country number of the ordering country determines the default line for line cord and shipping group.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer

is responsible for installation and maintenance of the cable and associated accessories.

**Twisted Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies Operation with your country.

The following accessories can be ordered:

	P/N
Switch Control Unit English	6052157
Switch Control Unit Canadian French	6052158
Switch Control Unit Spanish	6052159
Switch Control Unit Japanese	6052160
Clear Lens Keycaps/Paper Inserts/Removal Tool for Model C10/CD0/C20/CE0	6341707
Clear Lens Keytops/Paper Inserts/Removal Tool for Model C30/CF0	73X3878
Blank Keycaps (Light) and Removal Tool for Model C10/CD0/C20/CE0	1351710
Blank Keytops (Light) and Removal Tool for Model C30/CF0	73X3876
Blank Keycaps (Dark) and Removal Tool for Model C10/CD0/C20/CE0	1351728
Blank Keytops (Dark) and Removal Tool for Model C30/CF0	73X3877
Keycap Removal Tools (6) for Model C10/CD0/C20/CE0	1351717
Keytop Removal Tools (6) for Model C30/CF0	73X3887
Paper Inserts (150 Light and 150 Dark) for Model C10/CD0/C20/CE0	6341704
Paper Inserts (150 Light and 150 Dark) for Model C30/CF0	73X3886
Data Entry Keycap/Keytop Kit (US English) for: Model C10/CD0	1351741
Model C30/CF0	73X3881
APL Keycaps/Keycaps (US English) and Removal Tool for: Model C10/CD0	1351711
Model C30/CF0	73X3882
APL Keycaps/Keytops (Japanese Katakana) and Removal Tool for: Model C1X	1351718
Model C3X	73X3885
APL Keycaps (Canadian French) and Removal Tool for Model C1X	1351726
APL Keycaps (Spanish Speaking) and Removal Tool for Model C1X	1351727
PF Keycap Kit (US English) for Model C10/CD0/C20/CE0	1351742
PF/Numeric Keycap Kit for C10/CD0/C20/CE0	1391244
Blank Keyboard Overlay for: Model C10/CD0/C30/CF0	6341703
Model C20/CE0	6238058
Keyboard Overlay (US English) for:	

## MACHINES

Model C10/CD0/C30/CF0 81X4215  
Model C20/CEO 81X4220  
Keyboard Overlay (French) for Model C1X 81X4217  
Keyboard Overlay (Spanish) for Model C1X 81X4219  
Key Blanks for Security Keylock (10)\* For Keys Labelled:  
A00-A99 6238059  
D00-D99 64X9944  
Printer Cable 6457008

\* Duplicate Keys may be made locally from these key blanks. For local charges, consult your Marketing Representative.

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed. Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material for:	
Video	6317356
Logic	69X8197
Keyboard (122-key)	7343198
Keyboard (102-key)	7342889
Keyboard (104-key)	69X8207

**Keys:** The 3192 Model C is shipped with two keys. If keys are lost, the logic element should be sent to an IBM repair center or an IBM service/exchange center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see Accessories.

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3192 Model C.

**Order Entry:** For shipment, specify Machine Element (P/N) number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic, keyboard, pedestal and line cord of the 3192 Model C Color Display Station can be ordered as follows:

Element	P/N	Country
Video	6405302	Canada, Bahamas, Barbados, Bermuda, Jamaica, Trinidad, Surinam
Video	6405303	Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Taiwan
Video	6405304	Afghanistan, China,

Video	6405305	Bolivia, Ecuador,
Video	6405306	Australia, New Zealand
Video	6405307	Argentina, Bangladesh, Brunei, Burma, Chile, Hong Kong, Indonesia, Malaysia, Paraguay, Peru, Singapore, Sri Lanka, Thailand, Uruguay
Logic	6457001	All countries except Thailand
Logic	81X4155	Thailand
Keyboard 122-Key	1390703	Canadian French
Keyboard 124-Key	1390704	Japanese Katakana
Keyboard 122-Key	1390705	Spanish Speaking
Keyboard 122-Key	1390717	New Spanish
Keyboard 122-Key	1390702	US English
Keyboard 102-Key	1390766	US English
Keyboard 104-Key	1390768	Japanese Katakana
Keyboard 103-Key	1391728	Thailand
Keyboard 104-Key	73X3832	US English
Keyboard 106-Key	73X3838	Japanese Katakana
Pedestal	6457031	All Countries
Power Cord	6952297	Bolivia, Bermuda, Ecuador, Bahamas, Barbados, Costa Rica, Trinidad, Colombia, Guatemala, Dominican Rep., Haiti, Mexico, Netherlands Antilles, Jamaica, El Salvador, Korea, Nicaragua, Japan, Panama, Guyana, Taiwan, Honduras, Canada, Philippines, Surinam
Power Cord	6952285	Argentina, Paraguay, Uruguay
Power Cord	6952308	Australia, New Zealand, China
Power Cord	6952317	Afghanistan, Indonesia
Power Cord	6952344	Bangladesh, Burma, Sri Lanka
Power Cord	6952353	Brunei, Malaysia, Singapore
Power Cord	6952371	Chile
Power Cord	6952397	Peru, Thailand, Venezuela

## SUPPLIES (NONE)

## 3192 DISPLAY STATION MODEL D

### PURPOSE

The 3192 Display Station, Model D, is the newest member of the 3270 Information Display System. The 3192 Model D provides high quality, 1920-, 2,560-, 3,440-, or 3,564-character, 15-inch Green monochrome CRT with smudge-resistant screen. The 3192 Model D replaces and provides the functions of the 3180-1 as well as the following standard enhancements:

- Printer Port for local screen copy with screen trim options
- Increased Record/Pause/Play capability
- Rule
- Setup Mode
- Choice of keyboard and lower price.

The 3192 may be attached to the S/360, S/370, 43xx, 303x, 308x, 3090, S/8100, S/36 and S/38.

### MODEL D

**Model D1X:** Displays up to 3,564 characters on a Green monitor and provides 122-Key Typewriter Keyboard (modifiable) (Japan only) > or a 124-Key Japanese Katakana Typewriter Keyboard. <)

**Model D2X:** Displays up to 3,564 characters on a Green monitor and provides 102-Key IBM Enhanced Typewriter Keyboard (104-key Japanese Katakana).

**Model D3X:** Displays up to 3,564 characters on a Green monitor and provides 104-Key Typewriter Keyboard (106-key Japanese Katakana).

Language option selected will be designated by the third character of the model number as follows:

- Y US English
- D Canadian Bilingual/French (Not available on Model D2X, D3X)
- K Japanese Katakana
- S Spanish Speaking (Not available on Model D2X, D3X)
- C New Spanish (Not available on Model D2X, D3X)
- O Thailand (Not available on Model D1X, D3X)

**Limitations:** For model limitations, see Prerequisites.

The following are not available:

- Magnetic reader control and accessories
- Monocase switch
- Selector light-pen
- Video output

The following items should be taken into consideration when selecting the 3192 keyboard:

- 122-Key or 104-Key Typewriter Keyboard  
Available for the 3276, 43XX and 3274 with Configuration Support A, B, or C. For the 3274, Configuration Support D Release Level 63 or higher is required.
- 102-Key Enhanced Keyboard  
Requires Configuration Support D Release Level 65 on the 3274 with no-charge RPQ 7L0825.

**Prerequisites:** Attachment required on the 3174 or 3274 Control Unit (available Category A terminal port).

**Note:** If a 3192 Model Dxx is attached to a 3274:

- The 3192 Models D10 and D30 in Native Mode must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also required for changing the layout of the IBM 122-Key Typewriter Keyboard.

- The 3192 Model D20, operating in Native Mode only, must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and 3274 RPQ 7L0825.
- 3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3192 Model D.

(LAD only) > The RPQ 7L0625/7L0626 is required on 3274 to support the New Spanish (122-Key Typewriter) Keyboard for Latin America. <)

(APG only) > The RPQ 8K1555 is required on 3174 to support the Thai Language (103-Key IBM Enhanced Keyboard). <)

3274 RPQ 7L0825 is required to attach Model D2X and operates in Native Mode only.

3276 Available port or added #3255, #3256, or #3257. Allows attachment of Model D1X, D3X in Emulation Mode only.

4321 Standard Display/Printer Adapter on 4321. Allows attachment of 3192 Model D1X, D3X in Emulation Mode only.

4331 Standard Display/Printer Adapter on the 4331 or Display/Printer Adapter Expansion (#2001) on a 4331 model group 1 or 2. Allows attachment of a 3192 Model D1X or D3X in Emulation Mode only.

937X Workstation Adapter allows attachment of a 3192 Model D1X or D3X in Emulation Mode only.

4361 Standard Display/Printer Adapter or Workstation Adapter allows attachment of 3192 Model D1X or D3X in Emulation Mode only.

**Note:** Canadian French, Spanish Speaking and New Spanish are not available for D2X nor D3X.

**Customer Setup (CSU):** The 3192 Model D is a customer setup (CSU) machine. Setup instructions are included with each machine as "IBM 3192 Model D Color Display Station Setup Instructions", GA18-2530.

### HIGHLIGHTS

- Improved price/performance
  - Low price with discounts for volume procurement
  - 36-month warranty
  - Alert function for maintenance
- Functions
  - Printer Port for local screen copy
    - ▲ Screen Margin option
    - ▲ Various Print Options selectable at setup time
  - Record/Play/Pause
  - Rule
  - Setup Mode
    - ▲ Cursor Speeds selectable
    - ▲ Volume Control for Keyboard Click
  - Vertical Scroll
- Compatibility
  - 3270 compatible
- Screen Characteristics (Model D)
  - Screen size selectable at setup time
    - ▲ 1,920 Characters (80 x 24) plus Operator Information Area
    - ▲ 2,560 Characters (80 x 32) plus Operator Information Area
    - ▲ 3,440 Characters (80 x 43) plus Operator Information Area
    - ▲ 3,564 Characters (132 x 27) plus Operator Information Area
  - Larger character size than 3180 Model 1
  - Non-glare, 15-inch, Green monochrome CRT with Steady Image
  - Auto-Dim feature with Time-Out option
  - Row-Column Indicator

## MACHINES

- Keyboards
  - 122-Key Typewriter Keyboard (Modifiable)
  - (Except LAD > 102-Key IBM Enhanced Keyboard
  - 104-Key Typewriter Keyboard (Modifiable) <)
  - Coiled keyboard cable
  - Home row indicator keys
- Ergonomics
  - Smaller, lighter weight video unit
  - Tilt/Swivel pedestal
  - Small footprint
  - Low-profile keyboards

The 3192 Model D supports the following national languages:

### DESCRIPTION

The 3192 Model D is a high quality, 1,920-, 2,560-, 3,440-, or 3,564-character, 15-inch, Green monochrome CRT display station used for displaying alphanumeric data, and for entering data into, and receiving data from, the following systems:

#### System via Attachment

S/360	3274, 3276	Type A Adapter
S/370	3274, 3276	Type A Adapter
43xx	3174, 3274, 3276	Type A Adapter
937x	3174, 3274	Type A Adapter or Workstation Adapter
308x	3174, 3274, 3276	Type A Adapter
3090	3174, 3274, 3276	Type A Adapter
S/8100	3174, 3274	Type A Adapter
303x	3274, 3276	Type A Adapter
S/36	3174, 3274	Type A Adapter or
	5209 3270-5250	Link Protocol Converter
S/38	3174, 3274	Type A Adapter or
	5209 3270-5250	Link Protocol Converter
4321	Display/Printer	Adapter
4331	Display/Printer	Adapter
4361	Display/Printer	or Workstation Adapter

The 3192 consists of the following workstation elements:

	Models		
	D1x	D2x*	D3x*
Video 15-inch Green	X	X	X
Logic	X	X	X
IBM 122-Key Typewriter Keyboard	X		
IBM Enhanced Keyboard		X	
IBM 104-Key Typewriter Keyboard			X
Pedestal	X	X	X
Power Cord	X	X	X
Video Cable	X	X	X
Shipping Group	X	X	X

\* Not available in Canadian French, Spanish Speaking nor New Spanish.

- A typewriter style keyboard with either (Except LAD > 102/104 modifiable keys on the IBM Enhanced Keyboard <) or 122(APG only > /124 <) (modifiable) keys on the Typewriter Keyboard, provides 24 program functions, a numeric pad, and cursor-move keys. (Except LAD > Also available is the 104/106-Key Modifiable Typewriter Keyboard (no numeric pad). <)

A keyboard definition utility is supported in the 3192 to allow definition of customer specific (Except LAD > 104/106 <) or 122(APG only > /124 <)-key data keyboard layouts. A keycap removal tool is standard so that keycaps can be changed conveniently.

#### Printer Port

- The 4201/4202 (Proprinter) may be attached to the printer port to provide local screen copy. The 3192 provides, via set up mode, the ability to select the area of the screen to be printed, as well as the print quality, line density and pitch.

- Rule provides the ability to display the cursor by extending a line both vertically and horizontally. This facilitates finding the cursor on a busy screen as well as horizontal and/or vertical guide for rows and columns.
- Record/Pause/Play provides a method reducing keystrokes by recording and playing back often-used data.
- The Response Time Monitor, Alert, and Entry Assist capabilities are supported on the 3274 with Configuration Support D and the 3174.
- Adjustable Audible Alarm, Variable Auto-dim, and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position.
- Low-profile keyboards with coiled cable.
- Screen Characteristics
  - (Model D) 15-inch Green monochrome CRT provides a bright, steady presentation of either 80 x 24 or 80 x 32, 80 x 43 or 132 x 27 characters.
  - Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.
- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.
- Through the use of error indicators, off-line tests and the Customer Problem Solving guide, the customer may isolate a failing element for repair or replacement.
- Operator Factors: The 3192 Model D has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard slope can be adjusted by the user.
- Input Editing Capability: Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typamatic capability. Double speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available. When attached to a 3274 with Configuration Support D, or to a 3174, it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3174 or 3274 pages for languages supported.
- Cabling: IBM shielded twisted pair cable or coaxial cable is required for product attachment. The customer is responsible

for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to the "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

Coaxial Cable - For proper identification, installation and application of cable and associated accessories, refer to the "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and Coaxial Cable and Associated Manual", GA27-2805.

- Security Facilities: A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position. These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions. User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

#### Physical Specifications:

##### Video Element

Width - 361mm (14.2 inches)  
Depth - 337mm (13.3 inches)  
Height - 316mm (12.4 inches)  
Weight - 8.0kg (17.6 pounds)

##### Logic Element

Width - 300mm (11.8 inches)  
Depth - 290mm (11.4 inches)  
Height - 47mm (1.9 inches)  
Weight - 1.2kg (2.6 pounds)

##### Keyboard Element - 122-Key

Width - 561mm (22.1 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 3.0kg (6.6 pounds)

(Except LAD>

##### Keyboard Element - 102-Key

Width - 492mm (19.4 inches)  
Depth - 210mm (8.3 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 2.5kg (5.5 pounds)

##### Keyboard Element - 104-Key

Width - 419mm (16.5 inches)  
Depth - 204mm (8.0 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 1.8kg (4.0 pounds)<)

\* At Home Row.

#### Operating Environment:

Operating environment of configurable I/O units are different.

- 3192 Model D Class C:  
Temperature - 10 - 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent
- 4201, 4202 Class B:  
Temperature - 15.6 - 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity - 20 to 80 percent

#### Customer Responsibilities:

The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial setup, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3192 Model D.
4. Physical setup, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM service for attachment of the 3192 Model D communications cable to an on-site serviced IBM control unit where customer access area is not provided.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR)
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "IBM 3192 Display Station Description Manual", GA18-2544 for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3192 Model D units for such use. The number of spare units is dependent upon the number of the 3192 Model D units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3192 Model D to enhance the availability to the customer. This has been done through routines and procedures in the "IBM 3192 Model D Color Display Station Problem Solving Guide" which is used by the customer.

**Keyboards:** The emulation mode, which is only available on 122-key and 104-key keyboard is provided via 3174, 3274 and 3276. Native mode is available on all keyboard types. For the modifiable keyboard, native mode is provided via the 3274 Configuration Support D, Release Level 63 or higher and for 102-key IBM Enhanced Keyboard via 3274 Configuration Support D, Release Level 65 or higher with RPQ 7L0825 on the 3274. All keyboard types are supported native mode by 3174. (Japan only> The modifiable Katakana keyboard is not supported by 3274 in emulation mode nor in native mode.<)

- 122-key Typewriter Keyboard - with 2 angles inclination moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys. (Japan only> 124-key Japanese Katakana Typewriter Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode with modified keytop capability.
- 3276, 43XX, and 937X in Emulation Mode.
- IBM Enhanced Keyboard - Typewriter-like layout, moveable with 2 angles inclination (Canada only> 102-key English<).

(Japan only > 104-Key Japanese Katakana IBM Enhanced Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys. <)

**Note:** Can only be used with:

- 3174.
- 3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ 7L0825, in Native Mode. (Canadian French and Spanish Speaking are not available.)
- 104-Key Typewriter Keyboard - moveable with 3 angles of inclination and 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys. The keyboard layout is identical to the IBM 122-Key Typewriter Keyboard, but is without the 18-key keypad.
- (Japan only > 106-Key Japanese Katakana Typewriter Keyboard - typewriter layout, moveable. Provides 4-level shift with 50 data keys, 32 control keys and 24 individual Program Function keys. <)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode.

**Publications:** The following publications are available:

- GA18-2535 IBM 3192 Display Station Description.
- GA18-2529 IBM 3192-D Display Station User's Guide\*
- GA18-2530 IBM 3192-D Display Station Setup Instructions\*
- GA18-2531 IBM 3192-D Display Station Problem Solving Guide\*
- SY18-2174 IBM 3192 Display Station Repair Center Maintenance Information

\* A copy will be shipped with each machine.

The countries will print translated ship group documentation. Countries without translation centers (such as Austria and Switzerland) must request translated ship group documentation from the appropriate translation centers. The country Distribution Center will merge the translated documents with the hardware. Manufacturing will print non-translated ship group documentation and include it with the hardware (business as usual).

These publications are available immediately from Mechanicsburg.

**Note:** Customers should order the "IBM 3192 Display Station Description" for site planning and preparation work since this publication is not shipped with each machine. Customers may order the "IBM 3192 Display Station Repair Center Maintenance Information", SY18-2174, for repair. The other publications are shipped with the machine.

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz. or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft.) line cord with non-locking plug. The country number of the ordering country determines the default line for line cord and shipping group.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. Cable and associated accessories can be

purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies Operation with your country.

**Coaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "3270 Installation Manual - Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual", GA27-2805. Also the System Supplies Operation with your country. For pricing and ordering information, refer to the System Supplies Operation with your country.

The following accessories can be ordered:

	P/N
Switch Control Unit English	6052157
Switch Control Unit Canadian French	6052158
Switch Control Unit Spanish	6052159
Switch Control Unit Japanese	6052160
Clear Lens Keycaps/Paper Inserts/Removal Tool for Model D10/DD0/D20/DE0	6341707
Clear Lens Keytops/Paper Inserts/Removal Tool for Model D30/DF0	73X3878
Blank Keycaps (Light) and Removal Tool for Model D10/DD0/D20/DE0	1351710
Blank Keytops (Light) and Removal Tool for Model D30/DF0	73X3876
Blank Keycaps (Dark) and Removal Tool for Model D10/DD0/D20/DE0	1351728
Blank Keytops (Dark) and Removal Tool for Model D30/DF0	73X3877
Keycap Removal Tools (6) for Model D10/DD0/D20/DE0	1351717
Keytop Removal Tools (6) for Model D30/DF0	73X3887
Paper Inserts (150 Light and 150 Dark) for Model D10/DD0/D20/DE0	6341704
Paper Inserts (150 Light and 150 Dark) for Model D30/DF0	73X3886
Data Entry Keycap/Keytop Kit (US English) for: Model D10/DD0	1351741
Model D30/DF0	73X3881
APL Keycaps/Keycaps (US English) and Removal Tool for: Model D10/DD0	1351711
Model D30/DF0	73X3882
APL Keycaps/Keytops (Japanese Katakana) and Removal Tool for: Model D1X	1351718
Model D3X	73X3885
APL Keycaps (Canadian French) and Removal Tool for Model D1X	1351726
APL Keycaps (Spanish Speaking) and Removal Tool for Model D1X	1351727
PF Keycap Kit (US English) for	

Model D10/DD0/D20/DE0 1351742  
 PF/Numeric Keycap Kit for  
 Model D10/DD0/D20/DE0 1391244  
 Blank Keyboard Overlay for:  
 Model D10/DD0/D30/DF0 6341703  
 Model D20/DE0 6238058  
 Keyboard Overlay  
 (US English) for:  
 Model D10/DD0/D30/DF0 81X4173  
 Model D20/DE0 81X4194  
 Keyboard Overlay (French) for  
 Model D1X 81X4175  
 Keyboard Overlay (Spanish) for  
 Model D1X 81X4177  
 Key Blanks for Security Keylock  
 (10)\* For keys labelled:  
 A00-A99 6238059  
 D00-D99 64X9944  
 Printer Cable 6457008

\* Duplicate Keys may be made locally from these key blanks. For local charges, consult your Marketing Representative.

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed. Order from Country Telemarketing Representative.

Description	P/N
Field Packaging	
Material for:	
Video	69X8245
Logic	69X8197
Keyboard (122-key)	7343198
Keyboard (102-key)	7342889
Keyboard (104-key)	69X8207

**Keys:** The 3192 Model D is shipped with two keys. If keys are lost, the logic element should be sent to an IBM repair center or an IBM service/exchange center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see Accessories.

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3192 Model D.

**Order Entry:** For shipment, specify Machine Element (P/N) number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic, keyboard, pedestal and line cord of the 3192 Model D Display Station can be ordered as follows:

Element	P/N	Country
Video	6457150	Canada, Bahamas, Barbados, Bermuda, Jamaica, Trinidad, Surinam
Video	6459151	Bolivia, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Korea, Mexico,

Netherlands Antilles, Nicaragua, Panama, Taiwan	
Argentina, Australia	6457152
Chile, Indonesia, New Zealand, Paraguay, Peru, Singapore, Uruguay	
Afghanistan, Bangladesh, Brunei, Burma, China, Hong Kong, Malaysia, Sri Lanka, Thailand, Venezuela	6457160
All countries except Thailand	6457001
Thailand	81X4155
Canadian French	1390703
Japanese Katakana	1390704
Spanish Speaking	1390705
New Spanish	1390717
US English	1390702
US English	1390766
Japanese Katakana	1390768
Thailand	1391728
US English	73X3832
Japanese Katakana	73X3838
All Countries	6457162
Bolivia, Bermuda, Ecuador, Bahamas, Barbados, Costa Rica, Trinidad, Colombia, Guatemala, Dominican Rep., Haiti, Mexico, Netherlands Antilles, Jamaica, El Salvador, Korea, Nicaragua, Japan, Panama, Guyana, Taiwan, Honduras, Canada, Philippines, Surinam	6952297
Argentina, Paraguay, Uruguay	6952285
Australia, New Zealand, China	6952308
Afghanistan, Indonesia	6952317
Bangladesh, Burma, Sri Lanka	6952344
Brunei, Malaysia, Singapore, Hong Kong	6952353
Chile	6952371
Peru, Thailand, Venezuela	6952397

## SUPPLIES (NONE)

## 3192 DISPLAY STATION MODEL F

### PURPOSE

The 3192 Display Station Model F, a member of the 3270 Information Display System, provides high function, 1920-, 2,560-, 3440-, or 3564-character, 14-inch 7-color CRT with smudge-resistant screen. The 3192 Model F compliments the 3192 Models C and D and provides the following standard enhancements:

- Record/Pause/Play capability
- Rule
- Setup Mode
- Choice of keyboard
- One or three year warranty

The 3192 may be attached to the S/360, S/370, 43xx, 303x, 308x, 937x, 3090, S/8100, S/36 and S/38.

### MODEL F

**Model F1X:** Displays up to 3,564 characters on a 7-color monitor and provides a 122-Key (APG only) or a 124-Key (<) Typewriter Keyboard.

(Except LAD) **Model F2X:** Displays up to 3,564 characters on a 7-color monitor and provides 102/103/104-Key IBM Enhanced Typewriter Keyboard (103-Key Thai, 104-Key Japanese Katakana).

**Model F3X:** Displays up to 3,564 characters on a 7-color monitor and provides 104/106-Key Typewriter Keyboard (106-Key Japanese Katakana). (<)

These models support 16 major languages as well as eight languages from Code Page 6. Refer to "Product Structure Section" for details.

**Note:** Language option selected will be designated by the third character of the model number as follows:

- Y US English
- D Canadian French (Not available on Model F2X) (Available on Model F3X 10/87)
- K Japanese Katakana
- S Spanish Speaking (Not available on Model F2X, F3X)
- C New Spanish (Not available on Model F2X, F3X)
- O Thailand (Not available on Model F1X, F3X)

**Limitations:** For model limitations, see "Prerequisites".

The following are not available:

- Magnetic reader control and accessories
- Monocase switch
- Selector light pen
- Video output

The following items should be taken into consideration when selecting the 3192 keyboard:

- 122-Key or 104-Key Typewriter Keyboard: Available in Native or Emulation Mode. If keyboard is to be modified, the 3174 (any level) or 3274, Configuration Support D Release Level 63 or higher is required.
- 102-Key Enhanced Keyboard: Requires a 3174 or Configuration Support D Release Level 65 on the 3274 with no-charge RPQ 7L0825. If keyboard is to be modified, the 3174 Release Level 2 is required.

**Prerequisites:** Attachment required on the 3174 or 3274 Control Unit (available Category A terminal port).

**Note:** If a 3192 Model F is attached to a 3274:

- The 3192 Models F1X and F3X in Native Mode must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also re-

quired for changing the layout of the IBM 122/124-Key Typewriter Keyboard.

- The 3192 Model F20 operating in Native Mode only, must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and 3274 RPQ 7L0825.
- 3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3192 Model F.

(LAD only) The RPQ 7L0625/7L0626 is required on the 3274 to support the New Spanish (122/124-Key Typewriter) Keyboard. (<)

(APG only) The RPQ 8K1555 is required on the 3174 to support the Thai Language (103-Key IBM Enhanced Keyboard). (<)

3274 RPQ 7L0825 is required to attach Model F2X and operates in Native Mode only.

3276 Available port or added #3255, #3256, or #3257. Allows attachment of Model F1X, F3X in Emulation Mode only. 937x Workstation Subsystem Controller allows attachment of 3192 F1X, F3X in Emulation Mode only.

4321 Standard Display/Printer Adapter on 4321. Allows attachment of 3192 Model F1X, F3X in Emulation Mode only.

4331 Standard Display/Printer Adapter on the 4331 or Display/Printer Adapter Expansion (#2001) on a 4331 model group 1 or 2. Allows attachment of a 3192 Model F1X, F3X in Emulation Mode only.

937X Workstation Adapter allows attachment of a 3192 Model F1X, F3X in Emulation Mode only.

4361 Standard Display/Printer Adapter or Workstation Adapter allows attachment of 3192 Model F1X, F3X in Emulation Mode only.

**Customer Setup (CSU):** The 3192 Model F is a customer setup (CSU) machine. Setup instructions are included with each machine as "IBM 3192 Model F Color Display Station Setup Instructions", GA18-2648.

### HIGHLIGHTS

- Price/performance
  - Low price with discounts for volume procurement
  - 1- or 3-year warranty
  - Alert function for maintenance
- Functions
  - Printer Port for local screen copy -- Screen Margin option
  - Record/Play/Pause
  - Rule
  - Setup Mode
    - ▲ Cursor Speeds selectable
    - ▲ Volume Control for Keyboard Click
  - Vertical Scroll
- Compatibility (See "Compatibility" for details.)
  - 3270 compatible
- Screen Characteristics (Model F)
  - Screen size selectable at setup time
    - ▲ 1,920 Characters (80 x 24) plus Operator Information Area
    - ▲ 2,560 Characters (80 x 32) plus Operator Information Area
    - ▲ 3,440 Characters (80 x 43) plus Operator Information Area
    - ▲ 3,564 Characters (132 x 27) plus Operator Information Area
  - Non-glare, 14-inch, 7-color CRT with Steady Image
  - Extended Highlighting
  - Auto-Dim feature with Time-Out option
  - Row-Column Indicator
- Modifiable Keyboards

- 122/124-Key Typewriter Keyboard
- (Except LAD > 102/103/104-Key IBM Enhanced Keyboard
- 104/106-Key Typewriter Keyboard <)
- Coiled keyboard cable
- Home row indicator keys
- Ergonomics
  - Smaller, lighter weight video unit
  - Tilt/Swivel pedestal
  - Small footprint
  - Low-profile keyboards

The 3192 Model F supports the following national languages:

	3192-F1X	3192-F2X	3192-F3X
Canadian French	X	-	X
Spanish speaking	X	-	-
Japanese Katakana	X	X	X
Thai	-	X	-
US English	X	X	X

## DESCRIPTION

The 3192 Model F is a high function 1,920-, 2,560-, 3,440-, or 3,564-character, 14-inch, 7-color CRT display station used for displaying alphanumeric data, and for entering data into, and receiving data from, the following systems:

System	via Attachment
S/360	3274, 3276 Type A Adapter
S/370	3274, 3276 Type A Adapter
43xx	3174, 3274, 3276 Type A Adapter
937x	3174, 3274 Type A Adapter or Workstation Adapter
308x	3174, 3274, 3276 Type A Adapter
3090	3174, 3274, 3276 Type A Adapter
S/8100	3174, 3274 Type A Adapter
303x	3274, 3276 Type A Adapter
S/36	3174, 3274 Type A Adapter
S/38	3174, 3274 Type A Adapter
4321	Display/Printer Adapter
4331	Display/Printer Adapter
4361	Display/Printer or Workstation Adapter

The 3192 consists of the following workstation elements:

	Models		
	Flx	F2x*	F3x**
	FDO	FE0*	FF0**
Video 14-inch	X	X	X
Logic	X	X	X
IBM 122/124-Key Typewriter Keyboard	X		
IBM Enhanced Keyboard		X	
IBM 104/106-Key Typewriter Keyboard			X
Pedestal	X	X	X
Power Cord	X	X	X
Shipping Group	X	X	X

\* Not available in Spanish Speaking.

\*\* Not available in Spanish Speaking. Canadian French available 10/87.

- A typewriter style keyboard with (Except LAD > either 102/103/104 keys on the IBM Enhanced Keyboard or <) 122(APG only > /124 <) keys on the Typewriter Keyboard, pro-

vides 24 program functions, a numeric pad, and cursor-move keys. (Except LAD > Also available is the 104/106-Key Modifiable Typewriter Keyboard (no numeric pad). <)

A keyboard definition utility is supported in the 3192 Model F to allow definition of customer specific data keyboard layouts. A keycap removal tool is standard so that keycaps can be changed conveniently.

- PA3 key function is supported. To add PA3 nomenclature to the keyboard, use the appropriate Clear Lens Keycaps/Paper Insert accessory kit as listed in the "Accessories" section of this document.

## Printer Port

- The 4201/4202 (Proprinter) may be attached to the printer port to provide local screen copy. The 3192 provides, via set up mode, the ability to select the area of the screen to be printed, as well as the print quality, line density and pitch.

- Rule provides the ability to display the cursor by extending a line both vertically and horizontally. This facilitates finding the cursor on a busy screen as well as horizontal and/or vertical guide for rows and columns.

- Record/Pause/Play provides a method reducing keystrokes by recording and playing back often-used data.

- The Response Time Monitor, Alert, and Entry Assist capabilities are supported on the 3274 with Configuration Support D and the 3174.

- Adjustable Audible Alarm, Variable Auto-dim, and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position.

- Low-profile keyboards with coiled cable.

## Screen Characteristics

- (Model F) 14-inch 7-color CRT provides a bright, steady presentation of either 80 x 24 or 80 x 32, 80 x 43 or 132 x 27 characters.
- Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.

- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.

- Through the use of error indicators, off-line tests and the Customer Problem Solving guide, the customer may isolate a failing element for repair or replacement.

**Operator Factors:** The 3192 Model F has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard slope can be adjusted by the user.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typamatic capability. Double speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available.

When attached to a 3274 with Configuration Support D, or to a 3174, it provides capabilities which facilitate operator entry and editing

of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See 3174 or 3274 product descriptions for languages supported.

**Cabling:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to the "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

Coaxial Cable - For proper identification, installation and application of cable and associated accessories, refer to the "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and Coaxial Cable and Associated Manual", GA27-2805.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position. These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions. User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

#### Physical Specifications:

##### Video Element

Width - 347mm (13.7 inches)  
Depth - 386mm (15.2 inches)  
Height - 301mm (11.9 inches)  
Weight - 12.5kg (27.5 pounds)

##### Logic Element

Width - 300mm (11.8 inches)  
Depth - 290mm (11.4 inches)  
Height - 47mm (1.9 inches)  
Weight - 1.2kg (2.6 pounds)

##### Keyboard Element - 122/124-Key

Width - 561mm (22.1 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 3.0kg (6.6 pounds)

(Except LAD>

##### Keyboard Element - 102-Key

Width - 492mm (19.4 inches)  
Depth - 210mm (8.3 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 2.5kg (5.5 pounds)

##### Keyboard Element - 104-Key

Width - 419mm (16.5 inches)  
Depth - 204mm (8.0 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 1.8kg (4.0 pounds)<)

\* At Home Row.

#### Operating Environment:

Operating environment of configurable I/O units are different.

- 3192 Model F Class C:  
Temperature - 10 - 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent
- 4201, 4202 Class B:  
Temperature - 15.6 - 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity - 20 to 80 percent

#### Customer Responsibilities:

The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial setup, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3192 Model F.
4. Physical setup, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM service for attachment of the 3192 Model F communications cable to an on-site serviced IBM control unit where customer access area is not provided. This service is provided at the current hourly rates.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR)
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "IBM 3192 Display Station Description Manual", GA18-2535 for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3192 Model F units for such use. The number of spare units is dependent upon the number of the 3192 Model F units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3192 Model F to enhance the availability to the customer. This has been done through routines and procedures in the "IBM 3192 Model F Color Display Station Problem Solving Guide" which is used by the customer.

#### Keyboards

- 122/124-key Typewriter Keyboard (modifiable) - Moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan only) > 124-key Japanese Katakana Typewriter Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode with modified keytop capability.

- 3276, 43XX, and 937X in Emulation Mode.

- IBM Enhanced Keyboard (modifiable) - Typewriter-like layout, moveable (Canada only > 102-key English <)(Thailand only > 103-Key Thai <)
- (Japan only > 104-Key Japanese Katakana IBM Enhanced Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys. <)

**Note:** Can only be used with:

- 3174.
  - 3174 with Configuration Support A, Release 2 in Native Mode for modifiable keytop capability.
  - 3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ 7L0825, in Native Mode. (Canadian French and Spanish Speaking are not available.)
- 104/106-Key Typewriter Keyboard (modifiable)- moveable with 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys. The keyboard layout is identical to the IBM 122-Key Typewriter Keyboard, but is without the 18-key keypad.

- (Japan only > 106-Key Japanese Katakana Typewriter Keyboard - typewriter layout, moveable. Provides 4-level shift with 50 data keys, 32 control keys and 24 individual Program Function keys. <)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode.

**Publications:** The following publications are available:

- GA18-2535 IBM 3192 Display Station Description,
- GA18-2652 IBM 3192-F Display Station User's Guide\*
- GA18-2648 IBM 3192-F Display Station Setup Instructions\*
- GA18-2650 IBM 3192-F Display Station Problem Solving Guide\*
- SY18-2208 IBM 3192 Display Station Repair Center Maintenance Information

\* A copy will be shipped with each machine.

These publications are available immediately from Mechanicsburg.

**Note:** Customers should order the "IBM 3192 Display Station Description" for site planning and preparation work since this publication is not shipped with each machine. Customers may order the "IBM 3192 Display Station Repair Center Maintenance Information", SY18-2208, for repair. The other publications are shipped with the machine.

## SPECIFY

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz. or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft.) line cord with non-locking plug. The country number of the ordering country determines the default line for line cord and shipping group.
- The country number of the ordering country determines the default line for line cord and shipping group.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies Operation with your country.

**Coaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "3270 Installation Manual - Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual", GA27-2805. Also the System Supplies Operation with your country. For pricing and ordering information, refer to the System Supplies Operation with your country.

The following accessories can be ordered:

For local charges, consult your Marketing Representative.

	P/N
Switch Control Unit English	6052157
Switch Control Unit Canadian	
French	6052158
Switch Control Unit Spanish	6052159
Switch Control Unit Japanese	6052160
Clear Lens Keycaps/Paper	
Inserts/Removal Tool for	
Model F1X or F2X	6341707
Clear Lens Keytops/Paper	
Inserts/Removal Tool	
for Model F3X	73X3878
Blank Keycaps (Light) and	
Removal Tool for Model	
F1X or F2X	1351710
Blank Keytops (Light) and	
Removal Tool for Model	
F3X	73X3876
Blank Keycaps (Dark) and	
Removal Tool for Model	
F1X or F2X	1351728
Blank Keytops (Dark) and	
Removal Tool for Model	
F3X	73X3877
Keycap Removal Tools (6)	
for Model F1X or F2X	1351717
Keytop Removal Tools (6)	
for Model F3X	73X3887
Paper Inserts (150 Light and	
150 Dark) for Model	
F1X or F2X	6341704
Paper Inserts (150 Light and	
150 Dark) for Model F3X	73X3886
Data Entry Keycap/Keytop Kit	
(US English) for:	
Model F1X	1351741
Model F3X	73X3881
APL Keycaps/Keycaps	
(US English)	
and Removal Tool for:	
Model F1X	1351711
Model F3X	73X3882
APL Keycaps/Keytops (Japanese	

## MACHINES

Katakana) and Removal  
Tool for:  
Model F1X 1351718  
Model F3X 73X3885  
APL Keycaps (Canadian French)  
and Removal Tool for  
Model F1X 1351726  
APL Keycaps (Spanish Speaking)  
and Removal Tool for  
Model F1X 1351727  
PF Keycap Kit (US English) for  
Model F1X or F2X 1351742  
PF/Numeric Keycap Kit for  
Model F1X or F2X 1391244  
Blank Keyboard Overlay for:  
Model F1X or F3X 6341703  
Model F2X 6238058  
Keyboard Overlay  
(US English) for:  
Model F1X or F3X 81X4215  
Model F2X 81X4220  
Keyboard Overlay (French) for  
Model F1X 81X4217  
Keyboard Overlay (Spanish) for  
Model F1X 81X4219  
Key Blanks for Security Keylock  
(10)\* For keys labelled:  
A00-A99 6238059  
D00-D99 64X9944  
Printer Cable 6457008

\* Duplicate keys may be made locally from these key blanks.

**Keys:** The 3192-F is shipped with two keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see "Accessories" or "Supplies".

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3192 Model F.

**Order Entry:** For shipment, specify Machine Element (P/N) number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic, keyboard, pedestal and line cord of the 3192 Model F Display Station can be ordered as follows:

Element	P/N	Country
Video	81X6290	Canada, Bahamas, Barbados, Bermuda, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Taiwan, Trinidad,

Video	81X6292	Surinam
Video	81X6293	Afghanistan, China
Video	81X6294	Venezuela
Logic	81X5949	Australia, New Zealand
Keyboard	1390703	Argentina, Bangladesh, Brunei, Burma, Chile, Hong Kong, Indonesia, Malaysia, Paraguay, Peru, Sierra Leone, Singapore, Sri Lanka, Sudan, Thailand, Uruguay
Keyboard	1390704	All countries
Keyboard	1390705	Canadian French
Keyboard	1390706	Japanese Katakana
Keyboard	1390707	Spanish Speaking
Keyboard	1390708	Spanish
Keyboard	1390709	US English
Keyboard	1390710	US English
Keyboard	1390711	US English
Keyboard	1390712	US English
Keyboard	1390713	US English
Keyboard	1390714	US English
Keyboard	1390715	US English
Keyboard	1390716	US English
Keyboard	1390717	US English
Keyboard	1390718	US English
Keyboard	1390719	US English
Keyboard	1390720	US English
Keyboard	1390721	US English
Keyboard	1390722	US English
Keyboard	1390723	US English
Keyboard	1390724	US English
Keyboard	1390725	US English
Keyboard	1390726	US English
Keyboard	1390727	US English
Keyboard	1390728	US English
Keyboard	1390729	US English
Keyboard	1390730	US English
Keyboard	1390731	US English
Keyboard	1390732	US English
Keyboard	1390733	US English
Keyboard	1390734	US English
Keyboard	1390735	US English
Keyboard	1390736	US English
Keyboard	1390737	US English
Keyboard	1390738	US English
Keyboard	1390739	US English
Keyboard	1390740	US English
Keyboard	1390741	US English
Keyboard	1390742	US English
Keyboard	1390743	US English
Keyboard	1390744	US English
Keyboard	1390745	US English
Keyboard	1390746	US English
Keyboard	1390747	US English
Keyboard	1390748	US English
Keyboard	1390749	US English
Keyboard	1390750	US English
Keyboard	1390751	US English
Keyboard	1390752	US English
Keyboard	1390753	US English
Keyboard	1390754	US English
Keyboard	1390755	US English
Keyboard	1390756	US English
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Keyboard	1390760	US English
Keyboard	1390761	US English
Keyboard	1390762	US English
Keyboard	1390763	US English
Keyboard	1390764	US English
Keyboard	1390765	US English
Keyboard	1390766	US English
Keyboard	1390767	US English
Keyboard	1390768	US English
Keyboard	1390769	US English
Keyboard	1390770	US English
Keyboard	1390771	US English
Keyboard	1390772	US English
Keyboard	1390773	US English
Keyboard	1390774	US English
Keyboard	1390775	US English
Keyboard	1390776	US English
Keyboard	1390777	US English
Keyboard	1390778	US English
Keyboard	1390779	US English
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Keyboard	1390781	US English
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Keyboard	1390800	US English
Keyboard	1390801	US English
Keyboard	1390802	US English
Keyboard	1390803	US English
Keyboard	1390804	US English
Keyboard	1390805	US English
Keyboard	1390806	US English
Keyboard	1390807	US English
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Keyboard	1390809	US English
Keyboard	1390810	US English
Keyboard	1390811	US English
Keyboard	1390812	US English
Keyboard	1390813	US English
Keyboard	1390814	US English
Keyboard	1390815	US English
Keyboard	1390816	US English
Keyboard	1390817	US English
Keyboard	1390818	US English
Keyboard	1390819	US English
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Keyboard	1390824	US English
Keyboard	1390825	US English
Keyboard	1390826	US English
Keyboard	1390827	US English
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Keyboard	1390837	US English
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Keyboard	1390840	US English
Keyboard	1390841	US English
Keyboard	1390842	US English
Keyboard	1390843	US English
Keyboard	1390844	US English
Keyboard	1390845	US English
Keyboard	1390846	US English
Keyboard	1390847	US English
Keyboard	1390848	US English
Keyboard	1390849	US English
Keyboard	1390850	US English
Keyboard	1390851	US English
Keyboard	1390852	US English
Keyboard	1390853	US English
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Keyboard	1390856	US English
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Keyboard	1390858	US English
Keyboard	1390859	US English
Keyboard	1390860	US English
Keyboard	1390861	US English
Keyboard	1390862	US English
Keyboard	1390863	US English
Keyboard	1390864	US English
Keyboard	1390865	US English
Keyboard	1390866	US English
Keyboard	1390867	US English
Keyboard	1390868	US English
Keyboard	1390869	US English
Keyboard	1390870	US English
Keyboard	1390871	US English
Keyboard	1390872	US English
Keyboard	1390873	US English
Keyboard	1390874	US English
Keyboard	1390875	US English
Keyboard	1390876	US English
Keyboard	1390877	US English
Keyboard	1390878	US English
Keyboard	1390879	US English
Keyboard	1390880	US English
Keyboard	1390881	US English
Keyboard	1390882	US English
Keyboard	1390883	US English
Keyboard	1390884	US English
Keyboard	1390885	US English
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Keyboard	1390903	US English
Keyboard	1390904	US English
Keyboard	1390905	US English
Keyboard	1390906	US English
Keyboard	1390907	US English
Keyboard	1390908	US English
Keyboard	1390909	US English
Keyboard	1390910	US English
Keyboard	1390911	US English
Keyboard	1390912	US English
Keyboard	1390913	US English
Keyboard	1390914	US English
Keyboard	1390915	US English
Keyboard	1390916	US English
Keyboard	1390917	US English
Keyboard	1390918	US English
Keyboard	1390919	US English
Keyboard	1390920	US English
Keyboard	1390921	US English
Keyboard	1390922	US English
Keyboard	1390923	US English
Keyboard	1390924	US English
Keyboard	1390925	US English
Keyboard	1390926	US English
Keyboard	1390927	US English
Keyboard	1390928	US English
Keyboard	1390929	US English
Keyboard	1390930	US English
Keyboard	1390931	US English
Keyboard	1390932	US English
Keyboard	1390933	US English
Keyboard	1390934	US English
Keyboard	1390935	US English
Keyboard	1390936	US English
Keyboard	1390937	US English
Keyboard	1390938	US English
Keyboard	1390939	US English
Keyboard	1390940	US English
Keyboard	1390941	US English
Keyboard	1390942	US English
Keyboard	1390943	US English
Keyboard	1390944	US English
Keyboard	1390945	US English
Keyboard	1390946	US English
Keyboard	1390947	US English
Keyboard	1390948	US English
Keyboard	1390949	US English
Keyboard	1390950	US English
Keyboard	1390951	US English
Keyboard	1390952	US English
Keyboard	1390953	US English
Keyboard	1390954	US English
Keyboard	1390955	US English
Keyboard	1390956	US English
Keyboard	1390957	US English
Keyboard	1390958	US English
Keyboard	1390959	US English
Keyboard	1390960	US English
Keyboard	1390961	US English
Keyboard	1390962	US English
Keyboard	1390963	US English
Keyboard	1390964	US English
Keyboard	1390965	US English
Keyboard	1390966	US English
Keyboard	1390967	US English
Keyboard	1390968	US English
Keyboard	1390969	US English
Keyboard	1390970	US English
Keyboard	1390971	US English
Keyboard	1390972	US English
Keyboard	1390973	US English
Keyboard	1390974	US English
Keyboard	1390975	US English
Keyboard	1390976	US English
Keyboard	1390977	US English
Keyboard	1390978	US English
Keyboard	1390979	US English
Keyboard	1390980	US English
Keyboard	1390981	US English
Keyboard	1390982	US English
Keyboard	1390983	US English
Keyboard	1390984	US English
Keyboard	1390985	US English
Keyboard	1390986	US English
Keyboard	1390987	US English
Keyboard	1390988	US English
Keyboard	1390989	US English
Keyboard	1390990	US English
Keyboard	1390991	US English
Keyboard	1390992	US English
Keyboard	1390993	US English
Keyboard	1390994	US English
Keyboard	1390995	US English
Keyboard	1390996	US English
Keyboard	1390997	US English
Keyboard	1390998	US English
Keyboard	1390999	US English
Keyboard	1391000	US English
Keyboard	1391001	US English
Keyboard	1391002	US English
Keyboard	1391003	US English
Keyboard	1391004	US English
Keyboard	1391005	US English
Keyboard	1391006	US English
Keyboard	1391007	US English
Keyboard	1391008	US English
Keyboard	1391009	US English
Keyboard	1391010	US English
Keyboard	1391011	US English
Keyboard	1391012	US English
Keyboard	1391013	US English
Keyboard	1391014	US English
Keyboard	1391015	US English
Keyboard	1391016	US English
Keyboard	1391017	US English
Keyboard	1391018	US

## 3192 COLOR GRAPHICS DISPLAY STATION MODEL G

### PURPOSE

The 3192 Color Graphics Display Stations, Model G, are follow-on products to the 3179 Color Graphics Display Stations. These models are 8-color, 1,920- or 2,560-character, 14-inch CRTs for display of alphanumeric and presentation business graphics. The new models provide a print buffer with screen trimming capability for local alphanumeric and graphics screen copy. In addition, host-directed alphanumeric print support as a logical terminal is provided. The 3192 Model Gs support attachment of the IBM 3852 2 Color Printer and the 4201, 4202, and 5201 Model 2 printers. The printers may be attached directly or via the 3979 Expansion Unit. Additional attachments via the 3979 Expansion Unit include the 5277 Mouse and the 6180 Model 2, 6184, 7371 and 7372 Color Plotters. These new Color Graphics Display Stations support 122-key (APG only) or 124-key Katakana or 106-key Katakana < (Except LAD) and the 104-key < Typewriter and Typewriter/APL2 keyboards. The 3192 Model Gs attach to the 3174, 3274 Control Units and to the Workstation Subsystem Controller of the 9370 Processors.

### MODEL G

**Model G1X, GDX:** Displays up to 2,560 characters in 32 lines of 80 characters each. Eight colors, APA buffer and external highlighting. Provides:

Print buffer  
Host-directed alphanumeric-only print support  
Local alphanumeric and graphics screen copy  
3852 2 Color Printer, 4201, 4202, and 5201 Model 2 Printer support  
6180 Model 2, 6184, 7371 and 7372 Plotter support  
122-key Typewriter keyboard (APG only) or 124-key Katakana < Typewriter keyboard.

**(Except LAD) Model G3X, GFX:** Displays up to 2,560 characters in 32 lines of 80 characters each. Eight colors, APA buffer and external highlighting. Provides:

Print buffer  
Host-directed alphanumeric-only print support  
Local alphanumeric and graphics screen copy  
3852 2 Color Printer, 4201, 4202, and 5201 Model 2 Printer support  
6180 Model 2, 6184, 7371 and 7372 Plotter support  
104-key Typewriter keyboard < (APG only) or 106-key Katakana < (Except LAD) Typewriter keyboard.

**Model G4X, GGX:** Displays up to 2,560 characters in 32 lines of 80 characters each. Eight colors, APA buffer and external highlighting. Provides:

Print buffer  
Host-directed alphanumeric-only print support  
Local alphanumeric and graphics screen copy  
3852 2 Color Printer, 4201, 4202, and 5201 Model 2 Printer support  
6180 Model 2, 6184, 7371 and 7372 Plotter support  
104-key Typewriter keyboard < (APG only) or 106-key Katakana < (Except LAD) Typewriter/APL2 keyboard. <

Language option selected will be designated by the third character of the model number as follows:

GxY US English  
GxD Canadian French  
GxK Japanese Katakana  
GxS Spanish Speaking  
GxC New Spanish

Where 'x' denotes keyboard model specification.

### Limitations

- A 3178, 3179-100, 3180-1, 3191, 3192, 3278, or 3279 Display Station must be attached to Port 0 of the 3174, 3274 Control Unit or to the Workstation Subsystem Controller of the 9370 processor for customization and diagnostic support. (This display may be attached via a 3299.)
- Category B terminals (e.g., 3277 Display Stations) cannot be attached to the 3274 Control Unit when these units are customized to support the 3192 Model G.
- Plotters are only supported via IEEE488 interface.
- Attachment of the IBM 3852 2 Color Printer, 4201, 4202, 5201-2 printers to the logic unit of the 3192 Model G, or to the 3979 Expansion Unit, for local screen copy or host directed print support must specify printer interface cable #2058 (P/N 6342058).

An IBM Quiet Electronic Font Type A multilingual cartridge is required for attachment of the IBM Quietwriter(R) printer 5201 Model 2 to the 3192 Model G models. These fonts are available in a variety of typestyles and pitches. Consult the "Supplies Reference Guide for Information Processing Equipment" (71K6162 or G570-2098).

- (Japan only) The printer buffer (8K optional RAM) is required for attachment of the 4201 printer to support Japanese Katakana. <
- For host addressable printing, the 3192 Model G supports the IBM 3852 2 Color Printer, the 4201, 4202, and 5201 Model 2 printers as an SNA Logical Unit type 1 (LU-1) printer, as an SNA Logical Unit type 3 (LU-3) printer, or as a non-SNA printer with the following limitations
  - APL2 is supported on the 4201, 4202 printers only,
  - No Programmed Symbols (PS), and
  - Buffer size is 2K bytes maximum.
- Existing alphanumeric applications will run on the 3192 Model G unless the program is affected by:
  - 3174, 3274 Control Unit or Workstation Subsystem Controller of the 9370 Processor restrictions (e.g., no Category B terminals) or
  - Required display station configuration function restrictions not available with the 3192 Model G (e.g., magnetic readers, light pen, triple-plane programmable symbols, encryption/decryption or unsupported screen sizes).
- The 3192 Model G models may attach to an X.21 leased/switched network via the 3174, 3274 Control Unit. One 3178, 3179-100, 3180-1, 3191, 3192, 3278, or 3279 is required as a network control terminal attached to the 3174, 3274 Control Unit.
- BSC Copy Command is not supported.
- Programmable Symbols (PSA and PSB only) are supported in single color.

### Prerequisites

- A 3178, 3179-100, 3180 Model 1, 3191, 3192, 3278, or 3279 Display Station must be attached to Port 0 of the 3174, 3274 Control Unit or to the Workstation Subsystem Controller of the 9370 Processor.
- The 3192 Model G must be attached to the 3174 or 3274 Control Units and Workstation Subsystem Controller of the 9370 Processor with the required Load Diskette feature code. (See Hardware Requirements section.)
- Printer Logical Terminal (LT) address must be assigned in the host software to support host directed printer output at the 3192 Model G workstation.

- GDDM Version 1 Release 4 or GDDM Version 2 must be installed on the host processor for graphic support. (See Software Requirements section.)

**Customer Setup (CSU):** The 3192 Model G is designated as a Customer Setup machine. A copy of the "IBM 3192 Model G Color Graphics Display Station and IBM 3979 Expansion Unit Setup Instructions", GA18-2590 is included with each machine.

## HIGHLIGHTS

- Improved price/performance with discounts for volume procurement
- Enhanced printer support which provides a print buffer for local alphanumeric and graphics screen copy or host directed alphanumeric only print output.
- Provides attachment support for the IBM 3852 2 Color Printer and the 4201, 4202 and 5201-2 printers for local alphanumeric and graphics screen copy and host-directed alphanumeric print output.
- Provides plotter support to attach the 6180 Model 2, 6184, 7371, 7372 plotters via the 3979 Expansion Unit.
- Improved keyboard support to attach the 122-key (APG only) > or 124-key Katakana or 106-key Katakana < (Except LAD > and 104-key <) Typewriter and Typewriter/APL2 keyboards.
- Improved system connectivity by support of attachment to the 3174, 3274 Control Units and Workstation Subsystem Controller of the 9370 Processor via the IBM Cabling System without requirement for Balun.
- The 3192 Model G models support US English and the National Languages for Canadian French, Japanese Katakana, New Spanish, and Spanish Speaking.

## Hardware Requirements

- A 3178, 3179-100, 3180 Model 1, 3191, 3192, 3278, or 3279 Display Station must be attached to Port 0 of the 3174, 3274 Control Unit or Workstation Subsystem Controller of the 9370 Processor for customization and diagnostic support.
- 3274 Control Unit attachment: The 3192 Model G models must be attached to the 3274 Control Unit with Configuration Support D at microcode Release Level 65 and Load Diskette #9301 or #9311 (except Katakana), or #9305 or #9315 (Katakana only).

**Note:** BSC users should contact the 3274 National Service Division representative for support information; refer to IBM 3274 RETAIN TIP #779.

**Note:** Since a feature code load diskette is used to support the 3193, 3290, 3179 Model G, and the 3192 Model G models, customers should read the diskette label. (Except APG > #9301 supports <) (APG only > #9301, #9305 support <) the 3179 Model G, 3192 Model G and 3290. (Except APG > #9311 supports <) (APG only > #9311, #9315 support <) the 3179 Model G, 3192 Model G and 3193. The label will state if the 3192 Model G is supported.

- 3174 Control Unit Attachment: The 3192 Model G models attach to the 3174 Control Unit (except Models 81R and 82R) and require Load Diskette #9016.

**Note:** BSC users require Microcode Release A1.4 at Maintenance Level 86282 or Microcode Release A1.5.

- Workstation Subsystem Controller of the 9370 Processor Attachment: The 3192 Model G models attach to the Workstation Subsystem Controller, #6020, of the 9370 Processors and require Load Diskette #9016.

**Note:** Only one feature code load diskette is required to support the 3179 Model G and the 3192 Model G models when at-

tached to the 3174 Control Unit or to the Workstation Subsystem Controller of the 9370 Processor. Refer to the "IBM 3174 Control Unit Customization Guide, GA23-0214.

- Attachment of the IBM 3852 2 Color Printer, 4201, 4202, 5201 Model 2 printers to the logic unit of the 3192 Model G, or to the 3979 Expansion Unit, for local screen copy or host directed Print support must specify printer interface cable #2058 (P/N 6342058).

An IBM Quiet Electronic Font Type A multilingual cartridge is required for attachment of the IBM Quietwriter(R) printer 5201 Model 2 to the 3192 Model G models. These fonts are available in a variety of typesizes and pitches. Consult the "Supplies Reference Guide for Information Processing Equipment" (71K6162 or G570-2098).

- (Japan only > The printer buffer (8K optional RAM) is required for attachment of the 4201 Printer to support Japanese Katakana. <)

## Software Requirements

- GDDM Version 1 Release 4, or GDDM Version 2 for the appropriate operating environment (e.g. MVS, VM, VSE) plus PGF Version 2, must be installed on the host for graphic support. The following PTFs must be installed on GDDM Version 1.4 and PGF Version 1:

	OS	DOS/VSE	VM/370
GDDM	UP90176	UP90177	UP90178
Base	UP59304	UP59305	UP59306
PGF	UP90179	UP90180	UP90181
	UP59307	UP59308	UP59309

- BSC Users:

Customers installing the 3192-G for use over binary synchronous communication lines should customize the IBM Control Unit with BSC Enhanced Communications Option (176).

Customers operating under ACF/VTAM with ACF/NCP over Binary Synchronous (BSC) communication lines must be at an ACF/NCP Version 3 or higher level. Customers should contact their service representative for PTF prerequisites including the following PTFs:

NCP V3 on 3705	PTF UR12445
NCP V3 on 3725	PTF UR12446
NCP V4	PTF UR12444
SSP V1R2.2	PTF UR13293
SSP OS/MVS	PTF UR13294
SSP VM	PTF UR13295

**Operator Factors:** The 3192 Model G has an etched screen which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underlined-type cursor and a rectangular reverse video cursor, with blinking option, are provided. An enhanced full-screen cross-hair cursor or an alternate cross cursor is featured for graphic operations. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator via switches on the keyboard underside.

The video element may be tilted (4.4 degrees forward and 15 degrees backward), and may be rotated 180 degrees to change the screen angle for individual viewing comfort.

The keyboard has a low profile, is light-weight, has textured keytops to reduce glare, attaches with a flexible coiled cable permitting operator positioning, and may be inclined at any of three angles (122-key: 6, 12 or 18 degrees, 104-key: 4, 12 or 18 degrees) for individual comfort.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all key-

board input data, and erase entire screen) and cursor select keys are all basic. All alphanumeric and special symbol keys have typematic capability. Cursor move keys cause acceleration of the cursor when held down. Simultaneous depression of vertical and horizontal will cause diagonal movement. Fields of data can be selected by positioning the cursor, then using the cursor select key. If data fields are light pen detectable, the Selectable Field Tab function key will provide more rapid location. The 24 Program Function (PF) keys are provided on the keyboard in lower case mode.

Entry assist is supported. The 3192 Model G Entry Assist provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, word-wrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. (See M3274 and M3174 pages for details).

The 3192 Model G provides a screen trimming function which enables the operator to set screen boundaries for both upper and lower screen lines, and left and right columns of the display for local screen print copy. The boundaries are independently set for both the 1920 (24 lines x 80 characters) or the 2560 (32 lines x 80 characters) screen sizes. The boundaries are independently saved until either updated by the operator or power is turned off on the 3192 Model G. At power-on, the boundaries are reset to the top and bottom lines and to the left most (column 0) and right most (column 79) columns of the display area.

#### DESCRIPTION

The 3192 Model G Color Graphics Display Station models are follow-on products to the 3179-G Color Graphics Display Station. The 3192 Model G models are 8-color (red, green, blue, yellow, turquoise, pink, white and black background), 1,920/2,560-character, 14-inch CRT with bright, clear colors and a smudge-resistant screen surface. An all-points-addressable (APA) display provides a screen presentation of 720 x 384 picture elements in a viewable area of 240mm (9.4 in.) by 172mm (6.8 in.) and requires no color convergence adjustments. The new 3192 Model G models are compatible with the 3179 Model G in both alphanumeric and presentation graphics applications. The 3192 Model G models attach to the 3174 and 3274 Control Units and to the 9370 Processors via the Workstation Subsystem Controller, #6020.

The workstation capabilities are significantly enhanced by the provision of a print buffer with line trimming capability to allow print support for local alphanumeric and graphic screen copy or host addressable alphanumeric-only printer output. Host-directed printer support is addressed as a logical terminal.

The 3192 Model G models support attachment of the IBM 3852 2 Color Printer and the 4201, 4202 and 5201 Model 2 printers for local alphanumeric or graphics screen copy or host-directed alphanumeric-only printer output. Line pitch of either 6 or 8 lpi is selectable by operator setup of bit switches located on the keyboard underside.

Supports the attachment of the 6180 Model 2, 6184, 7371 and 7372 Plotters. All plotters attach to the 3979 Expansion Unit via the IEEE488 interface.

(Except LAD>Keyboard support is enhanced to include the 122-key<) (APG only> or 124-key Katakana<) (Except LAD>Typewriter keyboard, the 122-key<) (APG only> or 124-key Katakana<) (Except LAD>Typewriter/APL2 keyboard, the 104-key<) (APG only> or 106-key Katakana<) (Except LAD>Typewriter keyboard, and the 104-key<) (APG only> or 106-key Katakana<) (Except LAD>Typewriter/APL2 keyboards.<)

The keyboards feature modifiable keycaps, numeric keypad, 24 program function (PF) keys, improved cursor-move function keys, and a Selectable Field Tab function key for light pen detectable fields. (Except LAD>The 104-key<) (APG only> or 106-key<) (Except LAD>keyboard offerings allow the user to select a shorter keyboard if a numeric keypad is not required.<) The modified keyboard layouts are defined by switches located on the underside of

the keyboard (refer to "3192 Model G Color Graphics Display Station Operator Reference and Problem Solving Guide", GA18-2591, for information) and can be set by the operator. The keyboard definition utility allows customer definition of three specific keyboard layouts. The keyboard definition utility also allows customer definition of the 5277 Mouse function keys when attached via the 3979 Expansion Unit. A keycap removal tool is standard so that the keycaps can be interchanged conveniently.

The 3192 Model G models provide enhanced connectivity to the 3174 and 3274 Control Units and to the Workstation Subsystem Controller of the 9370 Processor via the IBM Cabling System without the requirement for Baluns. In addition, the 3192 Model G models may attach to an X.21 leased/switched network via the 3174 and 3274 Control Units. One 3178, 3179-100, 3180 Model 1, 3191, 3192, 3278 or 3279 is required as a network control terminal attached to the 3174 or 3274 Control Unit.

Host interactive graphics support on S/370, 43xx, 303x, 308x, 3090 and 9370 Processors is included in GDDM (Graphical Data Display Manager) Version 1 Release 4 or GDDM Version 2. Screen management functions are extended to interact with graphics information as well as with alphanumeric information.

One 3979 Expansion Unit may be attached to the 3192 Model G to allow attachment of the 5277 Mouse and the 6180 Model 2, 6184, 7371 and 7372 Color Plotters. The 3979 Expansion Unit provides an alternative port for the IBM 3852 2 Color Printer and the 4201, 4202, 5201 Model 2 Printers.

#### Notes:

- Attachment of the IBM 3852 2 Color Printer, 4201, 4202, 5201 Model 2 Printers to the logic unit of the 3192 Model G, or to the 3979 Expansion Unit, for local screen copy or host directed print support must specify printer interface cable #2058 (P/N 6342058).
- An IBM Quiet Electronic Font Type A multilingual cartridge is required for attachment of the IBM Quietwriter(R) Printer, 5201 Model 2, to the 3192 Model G models. These fonts are available in a variety of typesizes and pitches. Consult the "Supplies Reference Guide for Information Processing Equipment" (71K6162 or G570-2098).

#### Physical Specifications:

Video Element with Pedestal  
Width - 380mm (15.0 inches)  
Depth - 405mm (15.9 inches)  
Height - 407mm (16.0 inches)

Logic Element  
Width - 340mm (13.4 inches)  
Depth - 335mm (13.2 inches)  
Height - 60mm (2.4 inches)

(Canada only)  
Keyboard Element - 122-Key  
Width - 561mm (22.1 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*

Keyboard Element - 104-Key  
Width - 419mm (16.5 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*<)

(LAD only)  
Keyboard Element - 122-Key  
Width - 561mm (22.1 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*<)

(APG only)  
Keyboard Element - 122/124-Key  
Width - 561mm (22.1 inches)

Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches) \*

Keyboard Element - 104/106-Key  
Width - 419mm (16.5 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches) \*(<)

3979 Expansion Unit  
Width - 340mm (13.4 inches)  
Depth - 335mm (9.1 inches)  
Height - 60mm (2.4 inches)

(Canada only)  
Weight - 21.8kg (48 pounds):  
with 122-key keyboard  
Weight - 20.6kg (45 pounds):  
with 104-key keyboard(<)  
(LAD only)  
Weight - 21.8kg (48 pounds)<)  
(APG only)  
Weight - 21.8kg (48 pounds):  
with 122/124-key keyboard  
Weight - 20.6kg (45 pounds):  
with 104/106-key keyboard(<)

\* At Home Row.

**Note:** The 3979 Expansion Unit is required for attachment of the optional I/O devices such as mouse or plotters.

## Operating Environment:

Operating environment of configurable I/O units are different.

- 3192 Model G, 3979, 5277, 6180 Model 2, 6184, 7371 or 7372 Class C:  
Temperature - 10 - 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent
- 4201, 4202, 5201 Model 2 and IBM 3852 2 Color Printer Class B:  
Temperature - 15.6 - 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity - 20 to 80 percent

**Publications:** The following publications are shipped with the product:

- "IBM 3192-G Color Graphics Display Station and IBM 3979 Expansion Unit Setup Instructions", GA18-2590
- "IBM 3192-C Color Graphics Display Station Operator Reference and Problem Solving Guide", GA18-2591

The following publications are available:

- "IBM 3179-G/3192G Color Graphics Display Station Description", GA18-2589
- "IBM 3179-G/3192G Color Graphics Display Station Repair Center Maintenance Information", GA18-2099

Additional copies are immediately available from Mechanicsburg. To order, contact your IBM representative.

**Note:** Customers should order the "IBM 3179-G/3192G Color Graphics Display Station Description", GA18-2589 for site planning and preparation work since this publication is not shipped with each machine. Customers may order the "IBM 3179-G/3192G Color Graphics Display Station Repair Center Maintenance Information", GA18-2099 for repair. The other publications are shipped with each machine.

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz. or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft.) line cord with non-locking plug.
- The country number of the ordering country determines the default line for line cord and shipping group.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual- Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual", GA27-2805.

The following keyboard and switch control unit\* accessories can be ordered for 122-key(APG only) or 124-key(<) keyboards, Models G1x, G2x, GDx, and GEx:

Description	P/N
Clear Lens Keycaps/Paper Inserts/Removal Tool	6341707
Blank Keycaps (Light) and Removal Tool	1351710
Blank Keycaps (Dark) and Removal Tool	1351728
Keycap Removal Tools (6 tools)	1351717
Paper Inserts (150 Light and 150 Gray)	6341704

The following keyboard and switch control unit\* accessories can be ordered (Except LAD>for 104-key(<))(APG only) or 106-key(<) (Except LAD> keyboards, Models G3x, G4x, GFx, and GGx(<))

(Except LAD> Description	P/N
Clear Lens Keytops/Paper Inserts/Removal Tool	73X3878
Blank Keytops (Light) and Removal Tool	73X3876
Blank Keytops (Dark) and Removal Tool	73X3877
Keytop Removal Tools (6 tools)	73X3887
Paper Inserts (150 Light and 150 Gray)	73X3886

For all models: (<)	
Keyboard overlays (10 overlays)	
English	81X5744
Spanish	81X5745
French	81X5747
(Except LAD> Switch Control Unit *(<))	
English	6052157
Japanese	6052160
Canadian	6052158
Spanish	6052159

\* Permits switching operational control of the 3192 Model G between two different control units. The customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit. There is no switch control unit designed specifically for the 3192 Model G, but use can be made of the unit designed for the 3278 or 3279. The 3279 switch is suggested even though it does not fit readily under the foot of the 3192 Model G, since it is better adapted than the 3278 switch to a free-standing position.

For local charges, consult your IBM Marketing representative.

### CUSTOMER REPLACEMENT PARTS

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material	
For Video	6317356
For Logic (or Expansion Unit)	6316868
(Canada only>	
For 122-key Keyboard	7342987
For 104-key Keyboard	69X8207<)
(LAD only>	
For 122-key Keyboard	7342987<)
(APG only>	
For 122/124-key Keyboard	7342987
For 104/106-key Keyboard	69X8207<)
Keys (See Note)	6342xxx
xxx = (3 digits of key code numbers)	

**Note:** The 3192 Model G is shipped with two keys. Additional keys can be purchased from IBM. Key identification number must accompany each order. If the key identification number is unknown, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis.

### MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3192 Model G.

**Order Entry:** For shipment, specify Machine Element (P/N) at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic, keyboard, pedestal and line cord of the 3192 Model G Color Display Station can be ordered as follows:

Machine Element	P/N	
Video	8233436	Canada, Bahamas, Barbados, Bermuda, Jamaica, Surinam,
Video	8233437	Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Korea, Nicaragua, Netherlands-Antilles, Mexico,

Video	8233389	Panama, Taiwan
Video	8233440	Bolivia, Ecuador, Philippines
Video	8233391	Afghanistan, Venezuela, China
Video	8233392	Australia, New Zealand
		Argentina, Burma, Brunei, Bangladesh, Chile, Hong Kong, Indonesia, Malaysia, Peru, Paraguay, Singapore, Sri Lanka, Thailand, Uruguay
		All countries
Logic	64X9987	
122-key Keyboard-Typewriter/	1389164	Canadian French
122-key Keyboard-Typewriter/APL2	1389196	Canadian French
124-key Keyboard-Typewriter	1389168	Japanese Katakana
124-key Keyboard-Typewriter/APL2	1389200	Japanese Katakana
106-key Keyboard-Typewriter	73X3866	Japanese Katakana
106-key Keyboard-Typewriter/APL2	73X3874	Japanese Katakana
122-key Keyboard-Typewriter	1389166	Spanish Speaking
122-key Keyboard-Typewriter/APL2	1389198	Spanish Speaking
122-key Keyboard-Typewriter	1389180	New Spanish
122-key Keyboard-Typewriter/APL2	1389212	New Spanish
122-key Keyboard-Typewriter	1389162	US English
122-key Keyboard-Typewriter/APL2	1389194	US English
104-key Keyboard-Typewriter	73X3860	US English
104-key Keyboard-Typewriter/APL2	73X3868	US English
Pedestal	5954170	All countries
Video Cable	5881854	All countries
Line Cord	6952353	Brunei, Malaysia, Singapore, Hong Kong, Afghanistan, Indonesia, Australia,
Line Cord	6952317	
Line Cord	6952308	

Line Cord	6952371	New Zealand, China			Netherlands-
Line Cord	6952285	Chile			Antilles,
		Argentina, Paraguay			Nicaragua, Panama,
		Uruguay			Philippines,
Line Cord	6952297	Bahamas, Barbados,			Surinam,
		Bermuda, Bolivia,	Line Cord	6952344	Taiwan, Trinidad
		Canada, Colombia,			Bangladesh, Burma,
		Costa Rica,	Line Cord	6952397	Sri Lanka
		Dominican Republic			Peru, Thailand,
		Ecuador,			Venezuela
		El Salvador,			
		Guatemala, Guyana,			
		Haiti, Honduras,			
		Jamaica, Japan,			
		Korea, Mexico,			

SUPPLIES (NONE)

## 3192 DISPLAY STATION MODEL L

### PURPOSE

The 3192 Display Station Model L, a member of the 3270 Information Display System, provides high-quality, 1920- and 2,560-character, 14-inch 7-color CRT with smudge-resistant screen. The 3192 Model L provides a Selector Light Pen as well as the following standard functions:

- Printer Port for local screen copy with screen trim options
- Record/Pause/Play capability
- Rule and Setup Mode

The 3192 may be attached to the S/360, S/370, 43xx, 303x, 308x, 937x, 3090, S/8100, S/36 and S/38.

### MODEL L

**Model L1X:** 7-color, 14-inch monitor and provides 122-Key Typewriter Keyboard (124-Key Japanese Katakana).

**Model L2X:** 7-color, 14-inch monitor and 102-Key IBM Enhanced Typewriter Keyboard (104-Key Japanese Katakana).

**Model L3X:** 7-color, 14-inch monitor and provides 104-Key Typewriter Keyboard (106-Key Japanese Katakana).

Language option selected will be designated by the third character of the model number as follows:

- Y US English
- D Canadian French (Not available on Model L2X) (Available on Model L3X 10/87)
- K Japanese Katakana
- S Spanish Speaking (Only available on Model L1X)
- C New Spanish (Only available on Model L1X)

**Limitations:** For model limitations, see Prerequisites.

The following are not available:

- Magnetic reader control and accessories
- Monocase switch

- Video output

The following items should be taken into consideration when selecting the 3192 keyboard:

- 122-Key or 104-Key Typewriter Keyboard
  - Available in Native or Emulation Mode.
  - If keyboard is to be modified, the 3174 (any level) or 3274, Configuration Support D Release Level 63 or higher is required.
- 102-Key Enhanced Keyboard
  - Requires a 3174 or Configuration Support D Release Level 65 on the 3274 with no-charge RPQ 7L0825.
  - If keyboard is to be modified, the 3174 Release Level 2 is required.

**Prerequisites:** Attachment required on the 3174 or 3274 Control Unit (available Category A terminal port).

**Note:** If a 3192 Model L is attached to a 3274:

- The 3192 Models L10 and L30 in Native Mode must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 63 or higher. This level of support is also required for changing the layout of the IBM 122-Key Typewriter Keyboard.

- The 3192 Model L20, operating in Native Mode only, must be attached to a 3274 Control Unit with Configuration D - Microcode Release Level 65 or higher and 3274 RPQ 7L0825.
- 3274 Microcode and RPQ must be ordered well in advance in order to assure receipt prior to arrival of the 3192 Model L.

(LAD only) > The RPQ 7L0625/7L0626 is required on the 3274 to support the New Spanish (122-Key Typewriter Keyboard) for Latin America. <)

3274 RPQ 7L0825 is required to attach Model L2X

**Customer Setup (CSU):** The 3192 Model L is a customer setup (CSU) machine. Setup instructions are included with each machine as "IBM 3192 Model L Color Display Station Setup Instructions", GA18-2706.

### HIGHLIGHTS

- Selector Light Pen
  - A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The Selector Light Pen will detect on any color. A holder is provided for the Selector Light Pen while not in use.
- Improved price/performance
  - Low price with discounts for volume procurement
  - 1- or 3-year warranty
  - Alert function for maintenance
- Functions
  - Printer Port for local screen copy
    - ▲ Screen Margin option
    - ▲ Various Print Options selectable at Setup time
  - Record/Play/Pause
  - Rule
  - Setup Mode
    - ▲ Cursor Speeds selectable
    - ▲ Volume Control for Keyboard Click
  - Vertical Scroll
- Compatibility
  - 3270 compatible
- Screen Characteristics (Model L)
  - Screen size selectable at setup time
    - ▲ 1,920 Characters (80 x 24) plus Operator Information Area
    - ▲ 2,560 Characters (80 x 32) plus Operator Information Area
  - Non-glare, 14-inch, 7-color CRT
  - Extended Highlighting
  - Auto-Dim feature with Time-Out option
  - Row-Column Indicator
- Modifiable Keyboards
  - 122-Key Typewriter Keyboard
  - (Except LAD > 102-Key IBM Enhanced Keyboard
  - 104-Key Typewriter Keyboard <)
  - Coiled keyboard cable
  - Home row indicator keys
- Ergonomics
  - Smaller, lighter weight video unit
  - Tilt/Swivel pedestal
  - Small footprint
  - Low-profile keyboards

The 3192 Model L supports the following national languages:

	3192-L1X	3192-L2X	3192-L3X
Canadian French	X	-	X
Spanish	-	-	-
Speaking	X	-	-
New Spanish	X	-	-
Japanese	-	-	-

## MACHINES

Katakana	X	X	X
US English	X	X	X

## DESCRIPTION

The 3192 Model L is a high quality 1,920- or 2,560-character, 14-inch, 7-color CRT display station that provides a Selector Light Pen used for displaying alphanumeric data, and for entering data into, and receiving data from, the following systems:

### System via Attachment

S/360	3274, 3276	Type A Adapter
S/370	3274, 3276	Type A Adapter
43xx	3174, 3274, 3276	Type A Adapter*
937x	3174, 3274	Type A Adapter or Workstation Adapter
308x	3174, 3274, 3276	Type A Adapter
3090	3174, 3274, 3276	Type A Adapter
S/8100	3174, 3274	Type A Adapter
303x	3274, 3276	Type A Adapter
S/36	3174, 3274	Type A Adapter
S/38	3174, 3274	Type A Adapter

\* 3192 Model L does not attach to 43x1 WSA or DPA.

The 3192 consists of the following workstation elements:

	Models		
	L1x	L2x*	L3x**
Video 14-inch 7-Color	X	X	X
Logic	X	X	X
Selector Light Pen	X	X	X
IBM 122-Key Typewriter			
Keyboard	X		
IBM Enhanced Keyboard		X	
IBM 104-Key Typewriter			
Keyboard			X
Pedestal	X	X	X
Power Cord	X	X	X
Video Cable	X	X	X
Shipping Group	X	X	X

\* Not available in Canadian French, Spanish Speaking, or New Spanish.

\*\* Not available in Spanish Speaking or New Spanish. Canadian French available 10/87.

- A typewriter style keyboard with (Except LAD> either 102/104 keys on the IBM Enhanced Keyboard or <) 122(APG only>/124<) keys on the Typewriter Keyboard, provides 24 program functions, a numeric pad, and cursor-move keys. (Except LAD> Also available is the 104/106-Key Modifiable Typewriter Keyboard (no numeric pad).<)

A keyboard definition utility is supported in the 3192 Model L to allow definition of customer specific data keyboard layouts. A keycap removal tool is standard so that keycaps can be changed conveniently.

- PA3 key function is supported. To add PA3 nomenclature to the keyboard, use the appropriate Clear Lens Keycaps/Paper Insert accessory kit as listed in the "Accessories" section of this document.
- Printer Port
  - The 4201/4202 (Proprinter) may be attached to the printer port to provide local screen copy. The 3192 provides, via setup mode, the ability to select the area of the screen to be printed, as well as the print quality, line density and pitch.

- Rule provides the ability to display the cursor by extending a line both vertically and horizontally. This facilitates finding the cursor on a busy screen as well as horizontal and/or vertical guide for rows and columns.
- Record/Pause/Play provides a method reducing keystrokes by recording and playing back often-used data.
- The Response Time Monitor, Alert, and Entry Assist capabilities are supported on the 3274 with Configuration Support D and the 3174.
- Adjustable Audible Alarm, Variable Auto-dim, and Security Keylock are standard. Security key is removable in both LOCK and UNLOCK position.
- Low-profile keyboards with coiled cable.
- Screen Characteristics
  - (Model L) 14-inch 7-color CRT provides a bright, steady presentation of either 80 x 24 or 80 x 32 characters.
  - Etched, enhanced contrast CRT screen designed to reduce light reflections and fingerprint smudges to produce high-quality, high-resolution output.
- Video pedestal, provided as standard, provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be individually positioned.
- Through the use of error indicators, off-line tests and the Customer Problem Solving guide, the customer may isolate a failing element for repair or replacement.

**Operator Factors:** The 3192 Model L has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard slope can be adjusted by the user.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typematic capability. Double speed cursor and a horizontal cursor positioning key. Fields of data may be selected by positioning the cursor, then using the cursor select key. 24 PF keys are available.

When attached to a 3274 with Configuration Support D, or to a 3174, it provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3174 or 3274 pages for languages supported.

**Cabling:** IBM shielded twisted pair cable or coaxial cable is required for product attachment. The customer is responsible for installation and maintenance of the cable and associated accessories.

**IBM Shielded Twisted Pair Cable -** For proper identification, installation and application of cable and associated accessories, refer to the "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Coaxial Cable -** For proper identification, installation and application of cable and associated accessories, refer to the "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and Coaxial Cable and Associated Manual", GA27-2805.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position. These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions. User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

## Physical Specifications:

### Video Element

Width - 383mm (15.1 inches)  
Depth - 405mm (15.2 inches)  
Height - 345mm (13.6 inches)  
Weight - 12.7kg (28.0 pounds)

### Logic Element

Width - 300mm (11.8 inches)  
Depth - 290mm (11.4 inches)  
Height - 47mm (1.9 inches)  
Weight - 1.2kg (2.6 pounds)

### Keyboard Element - 122-Key

Width - 561mm (22.1 inches)  
Depth - 230mm (9.1 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 3.0kg (6.6 pounds)

### Keyboard Element - 102-Key

Width - 492mm (19.4 inches)  
Depth - 210mm (8.3 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 2.5kg (5.5 pounds)

### Keyboard Element - 104-Key

Width - 419mm (16.5 inches)  
Depth - 204mm (8.0 inches)  
Height - 30mm (1.2 inches)\*  
Weight - 1.8kg (4.0 pounds)

\* At Home Row.

## Operating Environment:

Operating environments of configurable I/O units are different.

- 3192 Model L Class C:  
Temperature - 10 - 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent
- 4201, 4202 Class B:  
Temperature - 15.6 - 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity - 20 to 80 percent

## Customer Responsibilities:

The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial setup, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3192 Model L.
4. Physical setup, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM service for attachment of the 3192 Model L communications cable to an on-site serviced IBM control unit where customer access area is not provided. This service is provided at the current hourly rates.

6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR)
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "IBM 3192 Display Station Description Manual", GA18-2700 for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3192 Model L units for such use. The number of spare units is dependent upon the number of the 3192 Model L units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3192 Model L to enhance the availability to the customer. This has been done through routines and procedures in the "IBM 3192 Model L Display Station Problem Solving Guide" which is used by the customer.

**Keyboards:** The emulation mode, which is only available on 122-Key and 104-Key keyboard, is provided via 3276, 3274 and 3174. Native mode is available on all keyboards types. For the modifiable keyboard, native mode is provided via the 3274 Configuration Support D, Release Level 63 or higher. Also, for the 102-Key IBM Enhanced Keyboard via 3274 Configuration Support D, Release Level 65 or higher with RPQ 7L0825 on the 3274. All keyboard types are supported native mode by 3174. (Japan only> The modifiable Katakana keyboard is not supported by 3274 in emulation mode or in native mode.<)

- 122-Key Typewriter Keyboard (modifiable) - with 2 angles inclination, moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan only> 124-key Japanese Katakana Typewriter Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode.
- 3274 with Configuration Support D (microcode Release 63 or higher) in Native Mode with modified keytop capability.
- 3276 and 937X in Emulation Mode.

- IBM Enhanced Keyboard - Typewriter-like layout, moveable with 2 angles inclination(Canada only> (102-key English).<)
- (Japan only> 104-Key Japanese Katakana IBM Enhanced Keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys.<)

**Note:** Can only be used with:

- 3174.
- 3274 with Configuration Support D (microcode Release 65 or higher) with 3274 RPQ 7L0825, in Native Mode. (Canadian French and Spanish Speaking are not available.)

- 104-Key Typewriter Keyboard (modifiable)- moveable with 3 angles of inclination and 49 alphanumeric keys, 31 control keys and 24 individual Program Function keys. The keyboard layout is identical to the IBM 122-Key Typewriter Keyboard, but is without the 18-key keypad.
- (Japan only) 106-Key Japanese Katakana Typewriter Keyboard - typewriter layout, moveable. Provides 4-level shift with 50 data keys, 32 control keys and 24 individual Program Function keys. <)

**Note:** Can be used with:

- 3174.
- 3274 with Configuration Support A, B, C, or D in Emulation Mode.
- 3274 with Configuration Support D (microcode release 63 or higher) in Native Mode.

**Publications:** The following publications are available:

- GA18-2700 IBM 3192 Display Station Description,
- GA18-2712 IBM 3192-L Display Station User's Guide\*
- GA18-2706 IBM 3192-L Display Station Setup Instructions\*
- GA18-2710 IBM 3192-L Display Station Problem Solving Guide\*
- SY18-2223 IBM 3192 Display Station Repair Center Maintenance Information

\* A copy will be shipped with each machine.

These publications are available from Mechanicsburg.

**Note:** Customers should order the "IBM 3192 Display Station Description" for site planning and preparation work since this publication is not shipped with each machine. Customers may order the "IBM 3192 Display Station Repair Center Maintenance Information", SY18-2223, for repair. The other publications are shipped with the machine.

## SPECIFY

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz. or 200-240V AC, 1-phase, 3-wire, 50-60 Hz.
- Line Cord: A 2.8m (9.0 ft.) line cord with non-locking plug. The country number of the ordering country determines the default line for line cord and shipping group.
- The country number of the ordering country determines the default line for line cord and shipping group.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

### Cables

**IBM Shielded Twisted Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies Operation with your country.

**Coaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "3270 Installation Manual - Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual", GA27-2805. Also the System Supplies Operation with your country.

The following accessories can be ordered:

For local charges, consult your Marketing Representative.

Description	P/N
Switch Control Unit English	6052157
Switch Control Unit Canadian French	6052158
Switch Control Unit Spanish	6052159
Switch Control Unit Japanese	6052160
Clear Lens Keycaps/Paper Inserts/Removal Tool for Model L10 or L20	6341707
Clear Lens Keytops/Paper Inserts/Removal Tool for Model L30	73X3878
Blank Keycaps (Light) and Removal Tool for Model L10 or L20	1351710
Blank Keytops (Light) and Removal Tool for Model L30	73X3876
Blank Keycaps (Dark) and Removal Tool for Model L10 or L20	1351728
Blank Keytops (Dark) and Removal Tool for Model L30	73X3877
Keycap Removal Tools (6) for Model L10 or L20	1351717
Keytop Removal Tools (6) for Model L30	73X3887
Paper Inserts (150 Light and 150 Dark) for Model L10 or L20	6341704
Paper Inserts (150 Light and 150 Dark) for Model L30	73X3886
Data Entry Keycap/Keytop Kit (US English) for: Model L10	1351741
Model L30	73X3881
APL Keycaps/Keycaps (US English) and Removal Tool for: Model L10	1351711
Model L30	73X3882
APL Keycaps/Keytops (Japanese Katakana) and Removal Tool for: Model L1x	1351718
Model L3x	73X3885
APL Keycaps (Canadian French) and Removal Tool for Model L1x	1351726
APL Keycaps (Spanish Speaking) and Removal Tool for Model L1x	1351727
PF Keycap Kit (US English) for Model L10 or L20	1351742
PF/Numeric Keycap Kit for Model L10 or L20	1391244
Blank Keyboard Overlay for: Model L10 or L30	6341703
Model L20	6238058
Keyboard Overlay (US English) for: Model L10 or L30	81X4215
Model L20	81X4220
Keyboard Overlay (French) for Model L1x	81X4217
Keyboard Overlay (Spanish) for Model L1x	81X4219
Key Blanks for Security Keylock (10)* For keys labelled:	

## MACHINES

A00-A99  
D00-D99  
Printer Cable

6238059  
64X9944  
6457008

Duplicate keys may be made locally from these key blanks.

**Keys:** The 3192-F is shipped with two keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see "Accessories" section.

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3192 Model L.

**Order Entry:** For shipment, specify Machine Element (P/N) number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic, keyboard, pedestal, Selector Light Pen and line cord of the 3192 Model L Display Station can be ordered as follows:

Element	P/N	Country
Video	6405302	Canada, Bahamas, Barbados, Bermuda, Jamaica, Trinidad, Surinam
Video	6405303	Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Taiwan
Video	6405304	Afghanistan, China, Venezuela
Video	6405305	Bolivia, Ecuador, Philippines
Video	6405306	Australia, New Zealand
Video	6405307	Argentina, Bangladesh, Brunei, Burma, Chile, Hong Kong, Indonesia, Malaysia, Paraguay, Peru, Singapore, Sri Lanka,

Logic	94X1840	Thailand, Uruguay
Keyboard	1390703	All countries
122-Key		Canadian French
Keyboard	1390704	Japanese Katakana
124-Key		
Keyboard	1390705	Spanish Speaking
122-Key		
Keyboard	1390717	New Spanish for Latin America
122-Key		
Keyboard	1390702	US English
122-Key		
Keyboard	1390766	US English
102-Key		
Keyboard	73X3834	Canadian French
104-Key		
Keyboard	1390768	Japanese Katakana
104-Key		
Keyboard	73X3832	US English
104-Key		
Keyboard	73X3838	Japanese Katakana
106-Key		
Pedestal	6457031	All Countries
Power Cord	6952297	Bolivia, Bermuda, Ecuador, Bahamas, Barbados, Costa Rica, Trinidad, Colombia, Guatemala, Dominican Rep., Haiti, Mexico, Netherlands Antilles, Jamaica, El Salvador, Korea, Nicaragua, Japan, Panama, Guyana, Taiwan, Honduras, Canada, Philippines, Surinam
Power Cord	6952308	Australia, New Zealand, China
Power Cord	6952317	Afghanistan, Indonesia
Power Cord	6952344	Bangladesh, Burma, Sri Lanka
Power Cord	6952353	Brunei, Malaysia, Singapore, Hong Kong
Power Cord	6952371	Chile
Power Cord	6952397	Peru, Thailand, Venezuela
Light Pen	94X1847	All Countries

## SUPPLIES (NONE)

## 3193 DISPLAY STATION

### PURPOSE

The 3193 Display Station is a member of the 3270 display family which provides the capability to display alphanumeric and image information. The 3193 provides multiple logical terminals, multiple partitioning, and up to 48 lines of alphanumeric display capability. Image documents of up to letter or A4 size may be displayed. Image handling capability is provided in conjunction with existing alphanumeric functions.

The 3193 Display Station is a high resolution, monochrome, portrait type, 15-inch CRT display terminal. Two logical terminals may be functional on the screen. The 3193 Display Station attaches to System/370, 43XX, 303X, 308X, 3090, and 9370 Processors via the 3174 and 3274 Control Units. The 3117 Scanner with 3117 Extension Unit feature and the 3118 Scanner can be attached to the 3193 Display Station. Image data compression is a technique to save transmission time and reduce storage requirements. Compressed images can be sent to the 3193 Display Station. Decompression of the image is performed in the 3193.

### MODELS

**Model 01X:** Displays up to 880 (horizontal) X 1200 (vertical) dots of image or up to 3840 alphanumeric characters in 48 lines of 80 characters, or mixture of image and alphanumeric characters. Provides 122-key or 124-key Katakana Typewriter keyboard.

**Model 02X:** Displays up to 880 (horizontal) X 1200 (vertical) dots of image or up to 3840 alphanumeric characters in 48 lines of 80 characters, or mixture of image and alphanumeric characters. Provides 103-key or 104-key Katakana Typewriter keyboard.

Language option selected will be designated by the third character of the model number. Specify the model number shown as follows:

OXY US English  
 OXD Canadian French  
 OXK Japanese Katakana  
 OXS Latin American Spanish

Where middle "X" denotes keyboard specification.

**Limitations:** Category "B" terminals (e.g., 3277 Display Stations) and 3290 Information Panel Display Station cannot be used on the same 3274 when the 3274 is customized to support the 3193 Display Station. Existing alphanumeric applications will run on the 3193 Display Station unless the program is affected by the 3274 Control Unit configuration restrictions (e.g., no Category B terminals) or required hardware functions are not available on the 3193 Display Station, e.g., magnetic readers, light pen, triple plane programmable symbols, encryption/decryption, unsupported screen sizes or graphics.

BSC Copy Command is not supported.

**Prerequisites:** A 3178, 3179, 3180, 3278 or 3279 Display Station with 1920 characters or larger screen must be attached to Port 0 of the 3274 Control Unit for customization and diagnostic support. The 3193 Display Station is designed to attach to the 3174 or 3274 Control Units. The supported 3174 Control Unit Mdl's are 1L, 1R, 2R, 3R, 51R, 52R or 53R with Feature Code #9017. The supported 3274 Control Unit Mdl's are 31A, 31C, 31D, 41A, 41C, 41D, 51C and 61C Support D at microcode Release 65.0 or higher and 3274 Load Diskette.

- The 3174 Downstream load diskette.
- The 3274 Downstream load diskette #9311 (except Katakana) or #9315 (Katakana only) provides space for 3 modified keyboard layouts per Control Unit. The diskette is supplied via microcode release level 65.0 or higher for the 3274 with configuration support D. The modified keyboard layouts are selected by the operator of the 3193 Display Station during setup

mode. The diskette is available at no charge and ordered via MSORDER from Raleigh.

**Customer Setup (CSU):** The 3193 Display station is a Customer Setup machine. A copy of the "Setup Instructions" (GA18-2366), which contain detailed CSU instructions, will be shipped with each machine.

**Spares:** It is recommended that the customer replace a failing element with a spare element and that the customer purchase sufficient spare 3193 Display Station units for such use. The number of spare units is dependent upon the number of the 3193 Display Station units the customer has installed, the application requirements, physical locations and layout. Determination of the required number of spares is the customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a complete machine or as individual elements. See "Accessories" and "Machine Elements" for ordering individual elements.

### HIGHLIGHTS

The 3193 Display Station represents an advanced function member of the 3270. Some of the highlights are as follows:

- 15-inch monochrome display 880 (Horizontal) x 1200 (Vertical) dots
- Multiple logical terminal capability (up to two logical terminals)
- 3278 Mdl's 2, 3, 4 Screen Support and 80 chars. x 48 lines
- Multiple partition capability (up to 8 partitions)
- Image datastream support
- Decompression of image data
- Image manipulation functions: Scale, Orient, Mirror, Invert, Fill
- 3117 Scanner Attachment (with 3117 Extension Unit feature)
- 3118 Scanner Attachment
- Entry assist function
- Scrolling functions
- Intel 80186 microprocessor
- Selectable cursors: alphanumeric, image cursor and image rectangle
- Display letter or A4 size image pages at 100 pels/inch
- Enlarge key to enlarge a viewport
- Roll-Your-Own keyboard (Except Katakana)

### DESCRIPTION

The 3193 Display Station is a new high resolution image display with 880 dots horizontally and 1200 dots vertically (48 dots worth of space are used as an operator information area leaving 1152 dots for display). The image capabilities are significantly enhanced by the provision of an all-points-addressable (APA) screen capability. The terminal utilizes a new 15-inch, portrait type, monochrome cathode ray tube and provides a full 8-1/2 X 11 inch or A4 size image display capability accepting compressed or uncompressed image data from the host system.

This display terminal supports multiple logical terminals and provides a user with viewing capability of alphanumeric data only, im-

age data only, or a combination of both image and alphanumeric data. The image displayed is represented by dots providing a high resolution white on a black background, or black on a white background by reversing images. Datastream compatibility with today's 3270 displays is provided in alphanumeric application environments. The 3193 Display Station is designed to support existing applications programmed for the 3270 (except where hardware features are not supported). See Limitations section for additional information. The character box size is 11 (horizontal) and 24 (vertical) dots.

Using the Intel 80186 (TM) microprocessor, the 3193 Display Station provides advanced display function for processing the alphanumeric and image information. One of its salient functions is to provide two logical terminals capability to the user. The terminal user may log-on to one or two applications or systems. Each configured screen acts like a separate display station, referred to as a logical terminal. Storage display buffers in the 3193 store data for presentation and display on the screen. Through the use of scrolling, the buffer contents can be displayed.

The 3193 Display Station is compatible with the 3278 Mdl's 2, 3, and 4. The screen formats in split-screen or full-screen configurations are as follows:

Split-screen configuration:

- Two full 3278 Mdl 2 screens
- One 3278 Mdl 1 screen of 24 rows and 80 columns and one image screen

Full-screen configuration: The following screens can exist singularly or two of them can coexist at a time (one is hidden under the other)

- One full 3278 Mdl's 2, 3, or 4 screen
- Up to 48 rows of 80 columns alphanumeric screen
- A full screen (image only or image and alphanumeric mixed)

The host can send image data with an image order that is executed in the 3193.

- Source Image Data: The 3193 accepts source image data which have the following characteristics.
  - Compression
    - ▲ Compressed with Modified Modified Read (MMR) format
    - ▲ Uncompressed
  - Horizontal and vertical resolution (in pels per inch)
    - ▲ Any combination of 240 and 120 horizontally and vertically, or any combination of 200 and 100 horizontally and vertically.
  - Some of the Image functions supported are:
    - ▲ Decompression and mapping of image data stream to approximately a 100 pel screen when pages are received in varying pel resolutions
    - ▲ Scale up or down the size of an image to: 4x, 3x, 2x, 3/2x, 4/3x, 1x, 3/4x, 2/3x, 1/2x, 1/3x, 1/4x
    - ▲ Image orientation rotates images 0, 90, 180 and 270 degrees
    - ▲ Image mirror rotates an image around a horizontal or vertical axis to present a view of image from the other side
    - ▲ Invert image changes each dot to reverse black/white
    - ▲ Image fill causes a defined rectangle to be filled with white or black
    - ▲ Attachment of 3117 Scanner via the 3117 Extension Unit feature or 3118 Scanner for scanning and transmitting images of documents to the host system

**Multiple Logical Terminals:** The 3193 Display Station provides multiple logical terminal capability (up to two), which allows a user to use the 3193 as two independent logical terminals, each of which interacts with its own host application program. This capability maximizes the use of the display terminal without modifying the existing applications. Only one of the logical terminals provides image capability. Both logical terminals can be used to support alphanumeric applications.

**Multiple Partitions:** The 3193 Display Station supports up to a total of 8 partitions in one or two logical terminals. A partition can be a part of the divided screen or can be a hidden one. Each partition will be separately managed via application program control. One partition can handle image data and the rest of the partitions alphanumeric data. A partition can display alphanumerics only, image only, or mixture of the image and alphanumerics.

A partition with which the terminal user can interact is called an active partition and only one partition can be active to the operator, at a time. The terminal user can successively activate partitions by pressing the Jump Partition key, and the application program can also activate any partition.

Setup mode is provided to setup the 3193 Display Station.

**Keyboards:** The 3193 is offered in two models differentiated only by the keyboard shipped:

- 3193 Model 01X is offered with a 122-Key Typewriter Keyboard.
- 3193 Mdl 02X, is offered with a 103-Key Typewriter Keyboard.
- 3193 Mdl 01K, is offered with a 124-key Japanese Katakana Typewriter Keyboard.
- 3193 Mdl 02K, is offered with a 104-key Japanese Katakana Typewriter Keyboard.

Note: X denotes language option selected.

Note: Keyboards used on other products are not interchangeable with keyboards used on 3193 Display Station.

The keyboard definition utility supports the 3193 Display Station allowing definition of customer specific keyboard layouts. The 3274 Downstream Load diskette provides space for 3 modified keyboard layouts per control unit. A keycap removal tool is standard so that keycaps can be interchanged conveniently.

**Keyboard functions are as follows:**

**Cursors:** Improved cursor movement is provided. Whenever cursor keys are kept depressed, the cursor accelerates. Two new cursors are provided in an image partition in addition to the alphanumeric cursor; i.e., an image cross cursor and an image rectangle cursor. The cross cursor informs a host program of a point on the screen and the rectangle cursor provides the host program with the co-ordinates of a rectangular area on a screen.

**Enlarge Key:** The Enlarge Key is used to enlarge the viewport to the physical screen size. For example, when an operator is using a split screen and is viewing half of an image in one logical terminal, the operator can press the Enlarge key and see the full page (the other logical terminal will disappear from the physical screen).

**Scroll Keys:** Four Scroll Keys are provided; left, right, forward, and backward. The following scrolling operation is performed while one of the scroll keys is depressed, depending on which partition is active.

- Alphanumeric only partition. Alphanumeric data will be scrolled. A scroll unit is a character cell.
- Alphanumeric and image partition. Alphanumeric and image data will be scrolled together. A scrolling unit is a character cell.
- Image only partition. Image data will be scrolled. A scrolling unit is 1 dot.

**Jump Key:** This key is effective only in two logical terminal operations. Pressing this key alternately makes each logical terminal active.

**Jump Partition Key:** This key is effective only in multi-partition operation. Pressing this key switches active partition from one to the next.

**Clear Partition Key:** Pressing this key causes all data in the active partition to be erased.

**Clear Key:** Pressing this key erases data in all presentation space(s) operating under an active logical terminal.

**Setup Key:** Pressing this key causes the 3193 to enter setup mode. The following are some of the typical items which can be set up by the terminal user:

- Screen layout: Full screen or split screen
- Logical Terminal Attributes
  - Screen model of each logical terminal (3278 Mdl 2, 3 or 4 or 48 rows x 80 columns screen)
  - Extended attributes
  - Numeric Lock on/off
  - Number of partitions: 0 to 8
- Display polarity: Dark on a bright background or bright on a dark background
- Keyboard ID (for keyboard layout selection)
- Audible alarm: Volume
- Mono/Dual case: Selection of either case
- Local copy: Viewport copy or presentation space copy

**Entry Assist:** 3193 supports Entry Assist capabilities for an operator for entry and editing of text material. The capabilities include: margins, tabs, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs.

**Roll Your Own Keyboard:** Three additional keyboard layouts can be defined in addition to the standard layout.

**Operator Factors:** The 3193 Display Station has a screen with anti-reflection treatment to minimize glare. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. An underline cursor and a rectangular reverse video cursor with blinking option, are provided for alphanumerics. The cross cursor and rectangle cursor are provided for image operations in the image partition. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator in the 3193 Display Station setup mode.

The video pedestal provides 19.4 degrees of tilt (plus 15 degrees to minus 4.4 degrees) and 180 degrees of swivel (plus or minus 90 degrees from the center position) to enable the display to be positioned properly.

The keyboard is low profiled and connected with a coiled cable. The keyboard provides three or two angles of inclination (6, 12 or 18 degrees for Mdl 1 keyboard and 6 or 12 degrees for Mdl 2 keyboard) for operator adjustment.

**Input Editing Capability:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen or partition) and cursor select keys are all standard. All alphanumeric and special symbol keys have typamatic capability. Cursor move keys cause acceleration of the cursor when held down. Simultaneous depression of vertical and horizontal cursor move keys will cause diagonal cursor movement. Fields of data can be selected by positioning the cursor,

then using the cursor select key. 24 Program Function (PF) keys are provided on Mdl 1 and Mdl 2 keyboards. The 3193 Display Station supports Entry Assist capabilities, which facilitate an operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs.

**Security Facilities:** Data security functions provided by the 3193 Display Station are non-display control (specified in the attribute byte) and the Security Keylock. A program defined non-displayed input mode is provided for fields of data, so that data is entered from the keyboard without being displayed on the screen. A Security Keylock prevents display of data on the 3193 Display Station unless the key is turned to the "UNLOCK" position. The key is removable in both the "LOCK" and "UNLOCK" positions.

#### Publications:

- "IBM 3193 Display Station Description" GA18-2364
- "IBM 3193 Display Station Setup Instructions" GA18-2366\*
- "IBM 3193 Display Station Operator's Guide" GA18-2365\*
- "IBM 3193 Display Station Problem Solving Quick Check Guide" GA18-2443\*
- "IBM 3193 Display Station Problem Solving Guide" GA18-2444\*
- "IBM 3193 Display Station Repair Center Maintenance Information" SY18-2134.

\* The publications marked with an asterisk or country language version of them will be shipped with each machine.

Contact your country publication department for the order form number assigned for each country.

**Note:** These manuals or country language version of these can be ordered from the country publication centers.

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Coaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 3270 Installation Manual-Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual", GA27-2805.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable hourly service rates and terms. Altered elements will not be eligible for the exchange or replacement services.

**On-site Assistance:** If the customer desires assistance in performing Customer Problem Analysis and Resolution (CPAR), the customer calls local IBM service branch office. IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer.

Customer owned spare elements can be installed to replace defective elements by IBM upon customer request. Shipping of defective elements to the Repair Center or Service/Exchange Center is a customer responsibility. All on-site assistance is provided on an hourly service basis at the applicable hourly service rates and terms.

## MACHINES

### SPECIFY

- Power: 100-127V AC, 1-phase, 3-wire, 50-60 Hz or 200-240V AC, 1-phase, 3-wire, 50-60 Hz. 2.8m (9.0 ft) line cord with non-locking plug.

The country number of the ordering country determines the line cord and shipping group.

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

The following keyboard and switch control units accessories can be ordered:

	P/N
Clear Lens Keycaps/Paper Inserts/Removal Tool	6341707
Blank Keycaps (Light) and Removal Tool	1351710
Blank Keycaps (Dark) and Removal Tool	1351728
Keycap Removal Tools (6 tools)	1351717
Paper Inserts (150 Light and 150 Gray)	6341704
Keyboard Overlays (10 overlays) for Model 01x	
English	6456082
Spanish	6456083
French	6456085
Keyboard Overlays (10 overlays) for Model 02x	
English	6456146
Spanish	6456147
French	6456149
Switch Control Unit*	
English	6052157
Japanese	6052160
Canadian French	6052158
Spanish	6052159

\* Note: Permits switching operational control of the 3193 Display Station between two different control units. The customer is responsible for procurement and installation of this accessory, and also for the replacement of a defective unit. There is no switch control unit designed specifically for the 3193 Display Station, but use can be made of the unit designed for the 3278 or 3279. The 3279 switch is suggested even though it does not fit readily under the foot of the 3193 Display Station since it is better adapted than the 3278 switch to a free-standing position.

For local charges, consult your IBM marketing representative.

### MACHINE ELEMENTS

Individual machine elements can be ordered as needed.

The video, logic, keyboard, pedestal and line cord of the 3193 Display Station can be ordered as follows:

- Video (P/N 6238880) -- Canada - Bermuda, Bahamas, Barbados, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Jamaica, Korea, Nicaragua, Netherlands Antilles, Mexico, Panama, Surinam, Taiwan, Trinidad -- Bolivia, Ecuador, Philippines
- Video (P/N 6238900) -- Australia, New Zealand -- Argentina, Chile, Hong Kong, Indonesia, Peru, Paraguay, Uruguay
- Video (P/N 6238902) -- Afghanistan, Bangladesh, Brunei, Burma, Hong Kong, Malaysia, Singapore, Sri Lanka, Thailand, Venezuela
- Logic (P/N 6238810) -- All AG-APG countries
- Keyboard-Tpwr Mod.1 (P/N 1391005); Mod.2 (P/N 1391066) -- Canadian French
- Keyboard-Tpwr Mod.1 (P/N 1391006); Mod.2 (P/N 1391067) -- Japanese Katakana
- Keyboard-Tpwr Mod.1 (P/N 1391007); Mod.2 (P/N 1391068) -- Latin American Spanish
- Keyboard-Tpwr Mod.1 (P/N 1390832); Mod.2 (P/N 1391065) -- US-English
- Pedestal (P/N 5954170) -- All AG-APG countries
- Line Cord (P/N 6952353) -- Brunei, Malaysia, Hong Kong, Singapore
- Line Cord (P/N 6952317) -- Afghanistan, Indonesia, Surinam
- Line Cord (P/N 6952308) -- Australia, New Zealand
- Line Cord (P/N 6952371) -- Chile
- Line Cord (P/N 6952285) -- Argentina, Paraguay, Uruguay
- Line Cord (P/N 6952297) -- Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Taiwan, Trinidad
- Line Cord (P/N 6952344) -- Bangladesh, Burma, Sri Lanka
- Line Cord (P/N 6952397) -- Peru, Thailand, Venezuela

### CUSTOMER REPLACEMENT PARTS

Following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material	
For Video	6481600
For Logic	6316868
For Model 1 keyboard	7342987
For Model 2 keyboard	7342889
Keys (Note)	6342xxx
(3 digits of key code numbers)	

**Keys:** The 3193 Display Station is shipped with two keys for Security Keylock. If the keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis.

### SUPPLIES (NONE)

## 3194 DISPLAY STATION

### PURPOSE

The 3194 Display Station is a high-function member of the 3270 Information Display System Family. It can be used with S/370, 43XX, 30XX, 9370 series processors and the 8100, via a 3X74 control unit, the 9370 Information System via the Workstation Controller feature #6020, and S/36 and S/38 via a 3X74 unit (remote attach only) or a 5209 3270-5250 Link Protocol Converter (in CUT mode only). All attachment environments are supported, i.e., SNA local channel, SNA remote, non-SNA local channel and BSC remote. Attachment to the 3X74 is via coaxial cable, IBM Cabling System Media, (with external balun) or telephone twisted-pair via IBM/ROLM 3270 Coax-to-Twisted-Pair-Adapter (with external balun).

The 3194 is available in many models, providing a choice of monitor and keyboard combinations. It offers a number of functions not available with other 3270 family members. It is compatible with the 3179-1 and applications written for that product will operate on the 3194.

The 3194 provides a programming interface called the Device Function Interface. Utility programs may be written in a high level language, compiled and linked on a 3270 PC (or PC with file transfer capability) and file transferred to the 3194 to execute. See the Device Function Interface section under "Special Features" for more details.

The base or default IBM 3194 Display Station format presentation is 24 x 80, 1,920 characters (3278 Model 2).

The 3278 (Model 2 to 5) display formats will be available on the 3194 models D and H (Canada only) (except Model H50) in Distributed Function Terminal mode only. The 3278 Model 2 and 3 display formats will be available on the 3194 C models in DFT mode only.

24 rows by 80 columns (3278 Model 2) 1,920 characters  
32 rows by 80 columns (3278 Model 3) 2,560 characters  
43 rows by 80 columns (3278 Model 4) 3,440 characters  
27 rows by 132 columns (3278 Model 5) 3,564 characters

### MODELS

The 3194 Display Station consists of three primary workstation elements: a logic unit, a monitor, and a keyboard. All models share a common logic unit and offer a choice of keyboards and monitors.

(Except Canada > Model CD0: A 12-Inch Color Display with the 122-Key Typewriter Keyboard.

**Model CE0:** A 12-Inch Color Display with the IBM Enhanced Keyboard.

**Model DD0:** A 15-Inch Monochrome Display with the 122-Key Typewriter Keyboard.

**Model DE0:** A 15-Inch Monochrome Display with the IBM Enhanced Keyboard.

**Model HD0:** A 14-Inch Color Display with the 122-Key Typewriter Keyboard.

**Model HE0:** A 14-Inch Color Display with the IBM Enhanced Keyboard.

**Note:** Not all models are available in all countries. Refer to the "Machine Element" section.

**Note:** The first position of the model number (C, D, or H) identifies the type of monitor. The second position (D, E, F) identifies the type of keyboard and a three-year warranty.

The model D has a green monochrome monitor.

The pedestal of the model C is an integral part of the monitor.

Monitors			
	Color		Mono
Keyboard	12"	14"	15"
122-Key Typewriter	CD0	HD0	DD0
IBM Enhanced Kbd. *	CE0	HE0	DE0

\* 102-Key

**High Resolution Monitors:** High resolution monitors, the type familiar to IBM 3192 and IBM Personal Computer users are:

- 14-inch (8 colors) with up to 1188 X 725 pel resolution.
- 12-inch (8 colors) with up to 720 X 400 pel resolution.
- 15-inch (monochrome) with up to 1188 X 544 pel resolution. <

(Canada Only > Model C10: A 12-Inch Color Display with the 122-Key Typewriter Keyboard.

**Model C20:** A 12-Inch Color Display with the IBM Enhanced Keyboard.

**Model D10:** A 15-Inch Monochrome Display with the 122-Key Typewriter Keyboard.

**Model D20:** A 15-Inch Monochrome Display with the IBM Enhanced Keyboard.

**Model H10:** A 14-Inch Color Display with the 122-Key Typewriter Keyboard.

**Model H20:** a 14-Inch Color Display with the IBM Enhanced Keyboard. <

(Canada Only > Model H50: A 14-Inch Color Display with the 122-Key Typewriter Keyboard.

The H50 is an early model of the 3194 with a unique logic unit, monitor, and keyboard. These elements, as well as the 3194 Microcode, Release 1.0 and 1.1, are not interchangeable with the other models of the 3194 Display Station. <

**Note:** (Canada Only > The first position of the model number (C, D, or H) identifies the type of monitor. The second position (1, 2, 3) identifies the type of keyboard and a one year warranty.

The model D has a green monochrome monitor.

The pedestal of the model C is an integral part of the monitor.

Monitors			
	Color		Mono
Keyboard	12"	14"	15"
122-Key Typewriter	C10	H10	D10
IBM Enhanced K/B*	C20	H20	D20

\* 102-Key <

(Canada Only > High Resolution Monitors: High resolution monitors, the type familiar to IBM 3192 and IBM Personal Computer users are:

- 14-inch (8 colors) with up to 1188 X 725 pel resolution.
- 12-inch (8 colors) with up to 720 X 400 pel resolution.

- 15-inch (monochrome) with up to 1188 X 544 pel resolution. <)

**Prerequisites:** When the 3194 is attached to a 3274 operating in DFT mode, configuration support D at release 64.2 or higher is required. When the 3194 is attached to a 3174, Microcode Release 1.0 or higher is required.

A host based file transfer program is required to complement the 3194 File Transfer utility function. Acceptable programs include:

MVS/TSO: 5665-311  
VM/SP: 5664-281  
CICS: 5798-DQH V1.6.1

See the "Device Function Interface" section under "Special Features" for Device Function Interface prerequisites.

**Limitations:** The following 3270 capabilities are not available in the 3194:

- 3270 diagnostic reset dump
- 3X74 entry assist feature (in DFT mode)
- Base (four color) color copy to the 3X74 attached printer
- Binary synchronous copy command
- Explicit partitions
- APL Character Set
- Keyboard types
- Magnetic reader control and accessories
- Monocase switch
- Selector light-pen
- Video output
- Modifiable keyboard (Canada only) > (not available on Model H50) <)

**Customer Setup (CSU):** The 3194 is designated as a customer setup machine. Setup instructions are included in the Customer Setup section of the "3194 User's Guide", shipped with each machine.

For Device Function Interface limitations, see the Device Function Interface section under Special Features.

## HIGHLIGHTS

The base or default 3194 Display Station screen format, in CUT mode is 24 x 80, 1,920 characters (3278 Model 2).

3278 model 2 to 5 display screen formats are available on the 3194 models D and H (Canada only) > except model H50 <) in Distributed Function Terminal mode only. 3278 model 2 and 3 display formats will be available on the 3194 C models in DFT mode only.

The 3194 offers enhanced functions over base color displays. Up to 30K bytes may be stored for Record/Play applications. A default customization profile is provided with three sessions defined: host, notepad and utility. Customization functions are provided to allow the customer to establish additional profiles beyond those provided by IBM.

The Device Function Interface is compatible with the 3270-PC High Level Language Application Program Interface, Version 3 (HLLAPI) and provides the same compatibility to the 3194 through the use of Device Function Interface utility programs. See the Device Function Interface section under Special Features for additional details.

Display functions include: non-display, blinking, underscore and reverse image (dark characters on a light background) on a field or character basis. The 3194 uses field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as color, protected/unprotected, alphanumeric, normal/intensified, and display/non-display.

(Canada only) > Asynchronous/ASCII support, see ASCII/VT100 feature #4900 for details. <)

The 122-key keyboard and the IBM Enhanced keyboard offer the Program Function (PF) keys in two locations, thereby duplicating the PF key positioning of other IBM keyboards. PF key location in concert with adjustable slope provides operator input and control flexi-

bility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink. An operator-adjustable alarm is provided to alert the operator to special conditions.

The 3194 consists of three workstation elements (monitor, logic and keyboard), a monitor tilt/swivel pedestal, microcode, and video module.

(Canada only) > (English only) A 4201-001 Proprinter may be attached via a 3194 Printer Attachment Feature (#4899, P/N 1614899) on the 3194-H50. <) On all models (Canada only) >, (English only) (except the Model H50) <) the 4201 Proprinter II Model 002, and the 4202 XL Proprinter may be attached to the Personal Printer Interface of the 3194 via P/N 1525612 (this cable may require a screwdriver to install). The 4201 will be supported as a 3194 local printer and will perform a full-screen copy function. As a 3194 local printer, it will not be visible to the host or the cluster controller. It is the customer responsibility to order and install the 4201 Proprinter. The 4201 will not be shipped with the 3194. Host print is not supported. See "Special Features" section for description.

**Operator Factors:** Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard slope can be adjusted by the user to 6 or 12 degrees.

The Device Function Interface provides the option to alter the operator interface for both the machine and host based applications. See the Device Function Interface section under Special Features for further details.

**Cabling:** The cable attachment between the 3194 and the 3X74 is via coaxial cable, IBM Cabling System Media (with external balun), or telephone twisted-pair via IBM/ROLM 3270 Coax-to-Twisted-Pair-Adapter (with external balun).

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display station if the key is turned to the "LOCKED" position.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

**Customer Problem Analysis and Resolution:** Functions have been designed into the 3194 to enhance the availability to the customer. This has been done through routines and procedures described in the Customer Setup section of the "IBM 3194 User's Guide".

**Ordering:** Elements and accessories can be ordered. See "Accessories" and/or "Machine Elements" section for the appropriate part numbers.

**Customer Responsibilities:** The customer is responsible for:

- Adequate site, system and other preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- During initial setup, install Repair Identification (RID) tags on the video and keyboard elements of the 3194.
- Physical setup, connection of cables in customer access areas, switch settings and checkout.
- Contacting an IBM customer service coordinator for attachment of the 3194 communications cable to an on-site serviced IBM control unit where customer access is not provided.

- Determination of the required number of spares.
- Performing problem determination to ascertain if a hardware or a microcode problem exists. The Problem Determination section of the "IBM 3194 User's Guide" and, as a supplement, the "3194 Operations and Control Program Reference", provide guidelines in the performance of this task.
- Contacting IBM CE Branch Office when on-site repair service is required.

**Site Planning and Preparation:** These are the responsibility of the customer. The customer should have on hand, or should order (Canada only > (except for Model H50) <) the "IBM 3194 Display Station Planning and Site Preparation Guide" as follows:

US English: GA27-3720  
German Austrian: GA12-2931

The customer should also order the "IBM 3194 Operations and Control Program Reference", as follows:

US English: SK2T-0311  
French: GA11-0614  
German Austrian: GA12-2932  
Spanish-Speaking: GA10-0178

(Canada only > For Model H50, the customer should order or have on hand the "IBM 3194 Pre-Installation Guide", GA23-0321, and the "IBM 3194 Operations and Control Program Reference", GA23-0315. <)

These manuals are required to do 3194 customization and are not shipped with the 3194.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3194 units for such use. The number of spare units is dependent upon the number of the 3194 units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares can be ordered as machines or individual workstation elements.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase of Maintenance Agreement and repair of that damage or replacement of missing, altered, or non-IBM parts will be charged for at IBM's then-applicable hourly service charges. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires help in performing Problem Isolation, the local IBM Service Branch Office may be called for their assistance. The CE will respond to the customer site to aid the customer in performing problem determination procedures using the same documentation available to the customer.

Customer owned spare workstation elements may be installed to replace defective workstation elements by the CE upon customer request. On-Site assistance is available on an hourly service basis at applicable rates and minimums.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center for repair on a time-and-material basis. After the expiration of warranty, an IBM maintenance agreement acceptance inspection is not normally required when the customer certifies, in writing, that the machine is physically and functionally in good working order, and that it has not been subject to neglect or misuse. IBM reserves the option to inspect a machine within one month following IBM's receipt of the Customer Certification for the machine. If IBM elects to exercise this option, there will be no charge for the inspection. Machines failing to pass the inspection must be repaired at the customer's expense prior to being eligible for IBM Maintenance Agreement coverage.

**Microcode Service:** Suspected microcode failures are to be reported by a registered service coordinator to the local IBM Service Branch Office. An IBM service representative will respond to the failure report within eight business hours by phone for further action. Microcode fixes will be supplied as a patch over the phone with periodic updates of the microcode via a refresh release. Notification of the availability of a new level of the microcode will be by mail to all registered customer service coordinators.

## Keyboards

- 122-Key Typewriter Keyboard - 49 alphanumeric keys, 31 control keys, 24 individual Program Function keys, and 18 numeric pad keys.
- IBM Enhanced Keyboard (102-key) typewriter-like layout, 48 alphanumeric keys, 24 control keys, 12 Program Function keys (24 functions) and 18 numeric pad keys.

## PHYSICAL DIMENSIONS

### Logic Unit (Controller):

3194(Canada only > (except Model H50) <):

Width: 362mm (14.5 in.)  
Height: 81mm (3.2 in.)  
Depth: 336mm (13.4 in.)  
Weight: 6.5kg (14.3 lb.)

(Canada only > 3194 (Model H50):

Width: 360mm (14.4 in.)  
Height: 81mm (3.2 in.)  
Depth: 335mm (13.4 in.)  
Weight: 6.3kg (13.9 lb.) <)

### Keyboard:

3194 (Model X1X) 122-Key Keyboard:

Width: 562mm (22.6 in.)  
Height: 60mm (2.4 in.)  
Depth: 230mm (9.2 in.)  
Weight: 3.0kg (6.6 lb.)

3194 (Model X2X) IBM Enhanced Keyboard:

Width: 492mm (19.7 in.)  
Height: 44mm (1.75 in.)  
Depth: 210mm (8.3 in.)  
Weight: 3.0kg (6.6 lb.)

(Canada only > 3194 (Model H50) 122-Key Keyboard:

Width: 560mm (22.4 in.)  
Height: 52mm (2.1 in.)  
Depth: 192mm (7.7 in.)  
Weight: 2.0kg (4.4 lb.) <)

### Monitor:

12-inch Color:

Width: 318mm (12.7 in.)  
Height: 320mm (12.8 in.)  
Depth: 350mm (14.0 in.)  
Weight: 10.0kg (22.0 lb.)

15-inch Monochrome:

Width: 361mm (14.4 in.)  
Height: 316mm (12.6 in.)  
Depth: 334mm (13.4 in.)  
Weight: 10.0kg (22.0 lb.)

14-inch Color(Canada only > (Including Model H50) <):

Width: 360mm (14.4 in.)  
Height\*: 370mm (14.8 in.)  
Depth: 405mm (16.2 in.)  
Weight: 14.0kg (30.8 lb.)

\* With pedestal

### Operating Environment:

	Operating	Power-Off
Temperature	60-90F	50-110F
Relative Humidity	8-80 percent	8-80 percent
Max Wet Bulb or Dew Point	73F	80F

### SPECIFIED OPERATING ENVIRONMENT

**Hardware Requirements:** The 3194 Display Station (Canada only > (except Model H50) <) is designed to operate with the 3194 Microcode, Release 2.0. (Canada only > The 3194 Model H50 Display Station is designed to operate with the 3194 Microcode, Release 1.0 or Release 1.1 (Device Function Interface and the 3194 Printer Attachment feature # 4899 require Release 1.1 on the model H50). <)

**System Attachment:** The 3194 attaches to S/370, 43XX, 308X, 3090, Processors, and the 8100 Information System, via a 3174 or 3274 control unit; to the S/36 or S/38 via a 3174 or 3274 (remote attach only) or to a 5209 3270-5250 Link Protocol Converter (in CUT mode only); or to the 9370 Information System via the Workstation Subsystem Controller (9370 Feature # 6020). All attachment environments are supported, i.e., SNA local channel, SNA remote, non-SNA local channel, and BSC remote.

All 3174 models (with Microcode Release 1.0 or higher) are supported.

All 3274 models are supported for CUT mode. For DFT mode, Configuration Support D at release 64.2 or higher is required.

It should be noted that RPQs for 3274 or 3174 are required to support the keyboards of the following countries in a CUT session. LAD, Spanish Speaking (RPQ 7L0626 on the 3274, standard on 3174), Canada (Bilingual) (RPQ 7L0624 on the 3274, RPQ 8K1347 on the 3174).

**Programming Support:** The 3194 is shipped with 3.5-inch diskettes containing the microcode.

**Host Software Requirements:** The 3194 File Transfer program requires the 3270-PC File Transfer Program in one of the following versions on the participating host: MVS/TSO (5665-311), or VM/SP with or without HPO (5664-281), or CICS Version 1, Release 6.1 (5798-DOH).

**Compatibility:** Current versions of IBM access methods, operating systems, application subsystems, and 3270 applications that conform to the appropriate attachment and data stream architectures (e.g. SNA, BSC, 3270DS, 370 channel, SDLC, X.25) will execute without change with the 3194.

**Publications:** (Canada only > For all models except H50) <) The following publications will be available from the IBM Mechanicsburg Distribution center with the general availability of the 3194.

**Note:** The "IBM 3194 Display Station User's Guide", as well as the "IBM 3194 Display Station Maintenance Information Manual", SY27-0310 (English only), is shipped with the 3194.

### IBM 3194 Display Station User's Guide:

US English: SK2T-0312  
Canada French: GA09-0442  
Spanish Speaking: GA10-0177

### IBM 3194 Display Station Operation and Control Program Reference:

US English: SK2T-0311  
Spanish Speaking: GA10-0178

### IBM 3194 Display Station Planning and Site Preparation Guide:

US English: GA27-3780

### IBM 3194 Display Station Maintenance Information Manual:

US English: SY27-0310

(Canada only > For H50 - The following publication is shipped as a unit with each 3194, "IBM 3194 User's Guide" (G126-0166). A copy of the microcode written to 3.5-inch diskettes is included in the package. The publication portion of the package may be ordered using the form number G126-0166.

The following publications will be available from the IBM Mechanicsburg distribution center with the general availability of the 3194:

- GA23-0321 IBM 3194 Pre-Installation Planning Guide
- GA23-0315 IBM 3194 Operations and Control Program Reference
- SY27-2583 IBM 3194 Maintenance Information Manual
- GA23-0320 3194 Display Station Preprinter Support Information

The following publication will be available from the Mechanicsburg Distribution Center at the general availability of the Device Function Interface:

- SA23-0314 IBM 3194 Device Function Interface Programmer's Guide

This manual is to be used as a supplement to the "IBM 3270-Personal Computer High Level Language Application Program Interface Programming Guide" and to the "IBM 3194 Operations and Control Program Reference". <)

### SPECIFY

- Power and Line Cord: 120V AC, 1-phase, 3-wire, 60 Hz. 2.8m (9.0 ft) line cord with non-locking plug. A 1.8m (6.0 ft) line cord with non-locking plug is available.

See "Machine Elements". The country will select a power cord plug to the specifications most commonly used in that country. See "Product Structure" under "Machine Elements" section.

### SPECIAL FEATURES

**Device Function Interface (standard):** The Device Function Interface is not a feature of the 3194 in that there is no feature code associated with it. It is a standard function that is shipped as part of the 3194 microcode, Release 1.1 (P/N 1614923) or later. However, its function is sufficiently important to warrant a separate section for its description and considerations. The Device Function Interface is an extension to the 3194 hardware that allows 3194 utility programs which have been developed on a 3270 PC to access workstation functions and services on the 3194 Display Station. The utility programs are created on a 3270 PC using the 3270-PC High Level Language Application Program Interface Program Product, Version 3 (59X9-959). Programmers may develop 3194 utility programs using the familiar programming languages, IBM COBOL 1.0 or IBM Pascal 2.0.

The Device Function Interface provides the 3194 user with a microcode-to-utility program interface that supports IBM COBOL 1.0 and IBM Pascal 2.0. The Device Function Interface allows development of programs having the ability to emulate the actions of the terminal operator.

Device Function Interface utilities are valuable in a variety of environments by allowing increased productivity for users. Device Function Interface utilities permit:

- Improvements in ease of use
  - Masking complicated host application generated screens and commands from the user

- Automated logon sequence
- Simplifying 3194 setup functions (e.g., creating windows, sizing, developing notepad functions)
- Simplifying existing host operations
- Providing unattended operation
- Creating composite screen applications

The 3194 Device Function Interface is compatible with the IBM 3270-PC HLLAPI Version 3. The same 44 Service Request functions provided by the 3270-PC HLLAPI are supported by the 3194 Device Function Interface. It is recommended that utility programs for the 3194 be compiled on the 3270 PC and tested on the 3194.

The 3194 is not intended to be used for execution of licensed personal computer programs. The programmer must be aware that programs written for the 3270 PC may not operate in exactly the same way on the 3194. Some functions will not be transportable to the 3194. For example, a program that sets background color on the 3270 PC will not perform that function on a 3194 since the background color on the 3194 is always black. Use of the Device Function Interface requires the use of the IBM 3270-PC HLLAPI, Version 3 (59X9-959). Getting the utility programs to the 3194 requires the use of file transfer programs on the utility program development machine, the host computer (see prerequisites above) and on the 3194. The file transfer programs for the 3194 are part of the microcode and for the utility program development machine are part of the IBM 3270-PC Control Program.

**(Canada only > 3194 Printer Attachment Feature (#4899, P/N 1614899):** (English and Model H50 only) Provides the capability to attach a 4201-001 Proprinter to the 3194 Display Station. The 4201 will be supported as a 3194 local printer and will perform a full-screen copy function. As a 3194 local printer, it will not be visible to the host or the communications controller. This feature includes a 4201 Attachment Cable (P/N 1614867) and a publication, "3194 Display Station Proprinter Support Information", GA23-0320. Prerequisite: Microcode, Release 1.1, P/N 1614923, is required on the 3194. Limitations: Host directed printing is not supported. Maximum: One. Field Installation: Yes.

**Note:** For models other than H50, the printer attachment cable for the Personal Printer Interface should be ordered separately using P/N 1525612 (this cable may require a screwdriver to facilitate installation). <

**Extended Character Set Feature\*:** Extended Character Set (where available) provides the ability to display more than the standard 92 Base Character Set.

The Extended Character Set will display the full 191 International character set. Documentation is provided in the "Operations and Control Program Reference Manual" and the "User's Guide", showing all of the characters available for display.

Please note that all 191 characters are not engraved on the keytops.

**Dependencies for Extended Character Set:** In order to display the full Extended Character Set, you must have the Extended Character Set Diskette Pack (3 Diskettes). The IBM Enhanced Keyboard is recommended. The Extended Character Set diskettes provide the full 191 characters in Distributed Function Terminal (DFT) mode only.

Customers should be aware that when selecting this option, characters may be displayed and placed in their data file which cannot be recognized by other devices such as terminals and printers. Your system coordinator should be consulted to determine any effect the Extended Character Set may have on your existing data files.

A procedure is provided to access (display) any character of the Extended Character set that is not engraved on the keytops. This procedure activates a single extended character. If another unique character is required, the process is repeated.

The country default character set (diskette set) will be furnished with the initial machine order, at no additional charge.

\* See Feature Code below for each language.

## EXTENDED CHARACTER SET FEATURE

## 3194 Display Station

## Language

Canadian English	(1)	
Canadian French	1615030	#5030
US English	(1)	
Spanish Speaking	1615034	#5034

## Notes:

1. Extended character set not available.

**(Canada only > ASCII/VT100 Feature (#4900, P/N 1615166)** (English only): ASCII/VT100 (Asynchronous/ASCII support) for the 3194 is provided in addition to existing IBM System/370 attachment support. With the feature card and microcode provided, the 3194 may be attached to an asynchronous/ASCII host and, through an additional window, emulate a DEC VT-100 (TM) terminal.

The VT100 supported functions include:

- 1,920/3,168-character screen.
- US English ASCII character set.
- VT52 mode.
- RS-232-C.
- 3194 Device Function Interface.
- Emulation Setup Utility.
- Attachment to the 5841 Modem or equivalent.
- Attachment to ROLM (R) CBX (R) DataCom Module (DCM) or Data Terminal Interface (DTI).
- Data rate up to 1200 bps.
  - ROLM is a registered trademark of ROLM Corporation.
  - CBX is a registered trademark of ROLM Corporation.

The following 3194 functions are available for use in the ASCII window:

- Full Device Function Interface Support.
- Record and Play.
- All 3194 set-up functions (window size, move, border color, cursor type).
- Screen print to attached Proprinter.
- Session-to-session copy. Using the 3194 COPY function, data may be copied from the ASCII session to any other session. As in the Utility session, data may not be copied via the COPY function into the ASCII session. However, Device Function Interface programs may be written to transfer data into the ASCII session and concurrently translate the copied data into keystrokes.
- The 3194 Device Function Interface provides access to the Asynchronous/ASCII window to allow user-written utilities to automatically query the presentation space and send keystrokes to the host.

**Prerequisite:** 3194 Display Station Microcode Release 2.0. Limitations: Not available on the Model H50. Maximum: One. Field Installation: Yes. <

**3194 Memory Feature (#5098, P/N 1615167):** Provides 192K bytes of memory for a total of 832K bytes. This additional memory can be used for customer-written Device Function Interface programs. Prerequisite: 3194 Display Station Microcode, Release 2.0. (Canada only > Limitations: Not available on the 3194 Model H50. <) Maximum: One. Field Installation: Yes.

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## ACCESSORIES

**Cables:** Attachment to the 3X74 is via coaxial cable, IBM Cabling System Media (with external balun) or telephone twisted pair via IBM/ROLM Coax-to-Twisted-Pair-Adapter (with external balun). Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

(Canada only > The following accessories can be ordered for Model H50:

DESCRIPTION	P/N
Blank keyboard overlays (10) (Model H50)	65X2424<

The following accessories can be ordered -- see "Model Limitations" as indicated:

DESCRIPTION	P/N
Overlay Blank for 122/104 key keyboard (10)	1615118
Overlay Preprinted for 122/104 key keyboard (10)	
Overlay Blank for IBM Enhanced Keyboard (10)	1615120
Overlay Preprinted for IBM Enhanced Keyboard (10)	1615121

For the 122-Key Keyboard, Models X10 Enhanced 102 Key Keyboard, models X20:

DESCRIPTION	P/N
Clear Lens Keycaps (60), removal tool and paper insert (60 light/60 dark)	6341707
Paper insert (150 light/ 150 dark)	6341704
Keycap Removal Tool	1351717

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed. Order from Country Telemarketing Representative.

**Keys:** The 3194 is shipped with two keys. If keys are lost, the lock (and key) assembly can be replaced by an IBM Service Representative. Lock replacement is available on an hourly service basis at applicable rates and minimums.

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3194.

**Order Entry:** For shipment, specify Machine Element (P/N) Number at time of order entry. Order individual workstation elements through the Telemarketing Representatives.

(Canada only > Elements/accessories can be ordered as follows for Model H50 only:

MACHINE ELEMENT	MSORDER P/N
--------------------	----------------

Logic element	6454111
Monitor	65X2115
122-Key keyboard	64X9709
Pedestal	65X2342
Line Cord - 1.8m (6.0 ft.)	6952301<

**Product Structure:** General Purpose Display(Canada only > (Standard Model - all models except the Model H50) <).

## Language Keyboards - Part Numbers

Language	Model C,D, H 122-Key Typewriter Keyboard	Model C,D, H IBM Enhanced Keyboard
US English	1392739	1392835
Canadian (French)	1392740	1392836
Spanish Speaking	1392741	1392837

## VIDEO ELEMENTS

VIDEO ELEMENTS  
12 INCH COLOR MONITOR FOR MODEL CXX

COUNTRIES	PART NUMBER
CANADA	8563236

BAHAMAS, BARBADOS,  
BERMUDA, COLOMBIA, COSTA  
RICA, DOMINICAN REPUBLIC,  
EL SALVADOR, GUATEMALA,  
GUYANA, HAITI,  
HONDURAS, JAMAICA, JAPAN,  
KOREA, MEXICO, NICARAGUA,  
NETHERLANDS ANTILLES,  
PANAMA, TAIWAN, TRINIDAD

VENEZUELA 8563240

BOLIVIA, BRAZIL, ECUADOR, NOT  
PHILIPPINES, SURINAM AVAILABLE

AUSTRALIA, NEW ZEALAND NOT

ARGENTINA, BANGLADESH, NOT  
BRUNEI, BURMA, CHILE, AVAILABLE  
HONG KONG, INDONESIA,  
MALAYSIA, PARAGUAY, PERU,  
SINGAPORE, SRI LANKA,  
SUDAN, THAILAND, URUGUAY

15 INCH MONOCHROME MONITOR  
FOR MODEL DXX

COUNTRIES	PART NUMBER
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CANADA 6457150

BAHAMAS, BARBADOS, 6457151  
BERMUDA, COSTA RICA,  
DOMINICAN REPUBLIC,  
EL SALVADOR, GUATEMALA,  
GUYANA, HAITI,  
HONDURAS, JAMAICA,  
KOREA, MEXICO,

## MACHINES

NETHERLANDS ANTILLES,  
NICARAGUA,  
PANAMA, TAIWAN,  
TRINIDAD, VENEZUELA

BOLIVIA, ECUADOR, 6457151  
PHILIPPINES

AUSTRALIA, NEW ZEALAND 6457152

ARGENTINA, BANGLADESH, 6457152  
BRUNEI, BURMA, CHILE,  
HONG KONG, INDONESIA,  
MALAYSIA, PARAGUAY, PERU,  
SINGAPORE, THAILAND, URUGUAY

JAPAN NOT  
AVAILABLE

14 INCH COLOR MONITOR FOR MODEL HXX

COUNTRIES PART NUMBER

BAHAMAS, BARBADOS, 1615016  
BERMUDA, CANADA,  
COLOMBIA, COSTA RICA,  
DOMINICAN REPUBLIC,  
EL SALVADOR, GUATEMALA,  
GUYANA, HAITI,  
HONDURAS, JAMAICA,  
JAPAN, KOREA, MEXICO,  
NETHERLANDS ANTILLES,  
NICARAGUA, PANAMA, TAIWAN,  
TRINIDAD

VENEZUELA 1615018

BOLIVIA, ECUADOR, 1615017  
PHILIPPINES

AUSTRALIA, NEW ZEALAND 1615019

ARGENTINA, BANGLADESH, 1615020  
BRUNEI, BURMA,  
CHILE, HONG KONG,  
INDONESIA, MALAYSIA,  
PARAGUAY, PERU, SINGAPORE,  
THAILAND, URUGUAY

LOGIC UNITS

COUNTRIES PART NUMBER

BAHAMAS, BARBADOS, 1614891  
BERMUDA, CANADA,  
COLOMBIA, COSTA RICA,  
DOMINICAN REPUBLIC,  
EL SALVADOR, GUATEMALA,  
GUYANA, HAITI,  
HONDURAS, JAMAICA,  
JAPAN, KOREA, MEXICO,  
NETHERLANDS ANTILLES,  
NICARAGUA, PANAMA,  
TAIWAN, TRINIDAD, VENEZUELA

BOLIVIA, ECUADOR, 1614891  
PHILIPPINES

AUSTRALIA, NEW ZEALAND 1614824

ARGENTINA, BANGLADESH, 1614824  
BRUNEI, BURMA, CHILE,  
HONG KONG, INDONESIA,  
MALAYSIA, PARAGUAY,  
PERU, SINGAPORE,  
THAILAND, URUGUAY

VIDEO MODULE

MODEL PART NUMBER

CXX 1615012  
DXX 1615011  
HXX  
(Canada only)>(Except H50)<  
1615010

PEDESTAL

MODEL PART NUMBER

CXX PART OF  
MONITOR  
DXX 1614850  
HXX 65X2342

COUNTRY POWER CORD

COUNTRIES PART NUMBER

BOLIVIA, BERMUDA, ECUADOR, 6952300  
BRAZIL, BAHAMAS, BARBADOS,  
COSTA RICA, TRINIDAD,  
COLOMBIA, GUATEMALA  
DOMINICAN REPUBLIC, HAITI,  
MEXICO, NETHERLANDS ANTILLES,  
JAMAICA, EL SALVADOR,  
KOREA, NICARAGUA,  
JAPAN, PANAMA, GUYANA,  
TAIWAN, HONDURAS, CANADA,  
PHILIPPINES, VENEZUELA

ARGENTINA, PARAGUAY, 6952291  
URUGUAY

AUSTRALIA, NEW ZEALAND 6952311

BRUNEI, MALAYSIA, 6952356  
SINGAPORE, HONG KONG

CHILE 6952374

PUBLICATIONS

IBM 3194 Display Station User's Guide

LANGUAGE FORM NUMBER

US English SK2T-0312  
CANADA  
(French) GA09-0442  
SPANISH  
SPEAKING GA10-0177

"IBM 3194 Display Station Maintenance  
Information Manual" (ENGLISH US)  
SY27-0310

DISKETTE PACK

(The BASE CHARACTER SET will  
be the default, if available,  
otherwise the EXTENDED

## MACHINES

CHARACTER SET will be the default)

**Extended Character Set:** Extended Character Set (where available) provides the ability to display more than the standard 92 Base Character Set.

The Extended Character Set will display the full 191 International character set. Documentation is provided in the Operations and Control Program Reference Manual and the User's Guide, showing all of the characters available for display.

Please note that all 191 characters are not engraved on the keytops.

Dependencies for Extended Character Set: In order to display the full Extended Character Set you must have the Extended Character Set Diskette Pack (3 Diskettes).

The IBM Enhanced Keyboard is recommended. The Extended Character Set diskettes provide the full 191 characters in Distributed Function Terminal (DFT) mode only.

Customers should be aware that when selecting this option, characters may be displayed and placed in their data file which cannot be recognized by other devices such as terminals and printers. Your system coordinator should be consulted to determine any effect the Extended Character Set may have on your existing data files.

A procedure is provided to access (display) any character of the Extended Character Set that is not engraved on the keytops. This procedure activates a single extended character. If another unique character is required, the process is repeated.

The country default character set (diskette set) will be furnished with the initial machine order, at no additional charge.

LANGUAGE	EXTENDED CHARACTER SET	BASE CHARACTER SET
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US English	NOT AVAILABLE	1614918
CANADIAN (English)	NOT AVAILABLE	1614918
CANADIAN (French)	1615030	1614947
SPANISH SPEAKING	1615034	1614951

## KEYBOARD OVERLAY

LANGUAGE	PART NUMBER
ENGLISH US	1615117
CANADIAN (French)	1615124
CANADIAN (English)	1615117
SPANISH SPEAKING	1615139

## POWER CORD ADAPTER

The Power Cord Adapter is a cable from the monitor to the logic unit on CXX and DXX models. This cable is not required on the HXX models.

(Except Australia > Use Low Voltage P/N 1615169. <)

**Maintenance:** Hourly service will be available at designated IBM Repair Centers only. This service is billable at the applicable IBM hourly service and minimum charge. Maintenance for elements is different by country. Contact your Country Service Department for the available maintenance in your country. Contact your IBM marketing representative for the warranty applicable in your country.

SUPPLIES (NONE)

## 3196 DISPLAY STATION

### PURPOSE

The 3196 Display Station is a member of the 5250 Information Display System, and can be used with the S/36 or S/38 locally attached or remotely attached via the 5294 Remote Control Unit (Models A10 and B10 only). A low-profile typewriter keyboard permits the operator to enter, display, and manipulate data on a 12-inch monochrome screen. This display station performs the same basic functions as the 5291-2 plus a number of added functions. It is capable of displaying up to 1,920 characters with 24 lines of 80 characters each. It also displays a 25th line containing an operator information area.

The 3196 is compatible with the 5291 Mdl 2 Display Station and applications written for that product will operate on the 3196.

### MODELS

**Model A1X:** Displays up to 1,920 characters in Green and provides a 122-key Typewriter Keyboard(Japan only> or 124-key Japanese Katakana Typewriter keyboard<).

**Model B1X:** Displays up to 1,920 characters in Amber-Gold and provides a 122-key Typewriter Keyboard(Japan only> or 124-key Japanese Katakana Typewriter keyboard<).

| **(AG only> Model A2X:** Displays up to 1,920 characters in Green and provides an IBM Enhanced Keyboard (103-key).

| **Model B2X:** Displays up to 1,920 characters in Amber-Gold and provides an IBM Enhanced Keyboard (103-key).<)

Language option selected will be designated by the third character of the model number as follows:

Y	English US
D	Canadian French
S	Spanish Speaking
K	Japanese Katakana
?	Thai

| **Prerequisites:** The 3196 models A1X and B1X attach to the IBM S/36, S/38, or 5294 Remote Control Unit via IBM Cabling System, twinaxial cable, or equivalent. Programming support is as follows:

- S/36: Release 4 or higher
- S/38: Release 7 or higher
- 5294:
  - On S/36 Release 5 or higher. Release 4 with PTF Diskette Level DK2203 or higher. (APG only> Model K01 and S01 require release 5 or higher.<) (LAD only> RPQ 8D0194 is required for Spanish Speaking.<)
  - On S/38 Release 8 or higher. Release 7 with Interim EC 837998F. (APG only> Model K01 and S01 require release 8 or higher.<) (LAD only> RPQ 8D0194 is required for Spanish Speaking.<)

| (AG only> The 3196 Mdls A20, B20, A2X and B2X attach to the S/36 and S/38. Programming support is:

- S/36: Release 5.0 or higher
- S/38: Release 8.0 or higher<)

For Thailand, one of the following RPQs is required for any 3196 Model:

5360	5362	5294	5381/82
8D0090	8D0214	8D0139	8D0270

**Customer Set-Up (CSU):** The 3196 is designated as a customer set-up machine. Set-up instructions (GA18-2488) are included with each machine.

### HIGHLIGHTS

- Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7 x 14 dot matrix in the 9 x 16 contiguous box matrix. Displays a 94 character set: 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters.
- (Canada only> With Canadian Bilingual/French keyboard, displays additional 30 unique Canadian French characters (total 124-character set).<)
- (Japan only> With Japanese Katakana keyboards, displays 127 character set).<)
- The 3196 offers functions equivalent to the 5291 mdl 2. In addition, the 3196 offers Record/Play, Set-Up mode, Auto-Dim, a choice of Green or Amber-Gold screens, and Text Assist symbols.
- Cable-Thru with Auto-Termination and Screen Glare Reduction are standard. 188-character Multinational Character Set is available: providing 112 alphabetic, 10 numeric, and 66 special displayable characters. Display functions include: nondisplay, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. An operator-adjustable alarm is provided to alert the operator to special conditions. The low-profile keyboard with adjustable slope and 24 application- assigned command functions provides input and control flexibility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink. The operator can also elect to display the cursor locations (row/column) and screen attribute codes being utilized as well as set the audible alarm volume.
- The 3196 uses field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphanumeric, normal/intensified, and displayable/non-displayable.
- The 3196 consists of three workstation elements (WSEs): video, logic and keyboard elements.
- Operator Factors: The 3196 has an etched screen, which minimizes glare and fingerprint. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to changed the screen angle for the operator. The keyboard slope can be adjusted by the user to 6 or 12 degrees.
- Field Editing: Individual data input fields can be edited as Alphanumeric, Alpha Only, Digits only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable and Monocase.
- Cabling: The cable attachment between the 3196 and other 5250 system components and/or systems may be made with IBM Cabling System, twinaxial cable, or equivalent. Cable connection: Maximum length of any one twinaxial cable is 1,525m (5,000 ft). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 3196. See "IBM 5250 Information Display System Planning and Site Preparation Guide" (GA21-9337), for cabling information.

- **Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position.

These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures" (G320-5649).

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial set-up, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3196.
4. Physical set-up, connection of cables in customer access areas, switch settings and checkout.
5. Contacting an IBM customer service coordinator for attachment of the 3196 communications cable to an on-site serviced IBM control unit where customer access area is not provided.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR).
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "IBM 3196 Display Station Description Manual", GA18-2521, for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3196 units for such use. The number of spare units is dependent upon the number of the 3196 units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution:** Functions have been designed into the 3196 to enhance the availability to the customer. This has been done through routines and procedures in the "IBM 3196 Display Station Problem Solving Guide" which is used by the customer.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase of Maintenance Agreement and repair of that damage or replacement of missing, altered, or non-IBM parts will be charged for at IBM's then-applicable hourly service charges. Altered elements will not be eligible for the exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing Problem Isolation, may be called for their assistance. The CE will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer.

Customer owned spare Workstation Elements may be installed to replace defective workstation elements by the CE upon customer request. Shipping of defective WSEs to the Repair Center or Service/Exchange Center is a customer responsibility. On-Site assistance is available on an hourly service basis at applicable rates and minimums.

Customers with machines not under an IBM Maintenance Agreement have the option to ship the machines to the designated IBM Repair Center or IBM Service/Exchange Center for element exchange on a time-and-material basis. After the expiration of warranty, an IBM maintenance agreement acceptance inspection is not normally required for Service/Exchange Center machines when the customer certifies, in writing, that the machine is physically and functionally in good working order, and that it has not been subject to neglect or misuse. IBM reserves the option to inspect an IBM Service/Exchange machine within one month following IBM's receipt of the Customer Certification of IBM Service/Exchange Center Machines, for the machine. If IBM elects to exercise this option, there will be no charge for the inspection. Machines failing to pass the inspection must be repaired at the customer's expense prior to being eligible for IBM Maintenance Agreement coverage.

#### Keyboards:

- 122-Key Typewriter Keyboard - Moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan only) > 124-key Japanese Katakana Typewriter keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys. <)
- (Canada only) > IBM Enhanced Keyboard (102-key) - typewriter-like layout, moveable with 48 alphanumeric keys, 24 control keys, 12 Program Function keys (24 functions) and 18 numeric pad keys. <)
- (AG only) > IBM Enhanced Keyboard (103-key) - typewriter-like layout, moveable with 49 alphanumeric keys, 24 control keys, 12 Program Function Keys (24 functions) and 18 numeric pad keys. <)

#### Publications:

- "IBM 3196 Display Station Description" (Canada only > GA18-2481 <) (LAD only > GA18-2521 <)
- The following are shipped with the product:
- "IBM 3196 Display Station User's Guide" (Canada only > GA18-2482 <) (LAD only > GA18-2515 <)
- "IBM 3196 Display Station Set-Up Instructions" (Canada only > GA18-2488 <) (LAD only > GA18-2513 <)
- "IBM 3196 Display Station Problem Solving Guide" (Canada only > GA18-2483 <) (LAD only > GA18-2514 <)
- "Attaching the IBM 3196 to System/36 and System/38" (Canada only > GA18-2548 <) (LAD only > GA18-2549 <)
- "IBM 3196 Display Station Repair Center Maintenance Information Manual" (Canada only > SY18-2161 <) (LAD only > SY18-2172 <)

#### SPECIFY

- Power: 100-127V, 200-240V, 1-phase, 3-wire, 50-60 Hz. 2.8m (9 ft) line cord with non-locking plug.

The country number of the ordering country determines the default for line cord and shipping group.

**RPQs:** RPQs will not be accepted for the 3196 Display Station.

## MACHINES

### SPECIAL FEATURES (NONE)

### ACCESSORIES

**Cables:** IBM Cabling System, twinaxial cable (or equivalent) is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Twinaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 5250 Information Display System Planning and Site Preparation Guide" (GA21-9337).

The following accessories can be ordered:

- Blank keycaps light (60 caps) and keycap removal tool (P/N 1351710)
- Blank keycaps dark (60 caps) and keycap removal tool (P/N 1351728)
- Clear lens keycaps (60 caps) with paper inserts (60 light and 60 dark) and keycap removal tool (P/N 6341707)
- Paper inserts for clear lens keycaps (150 light and 150 dark) (P/N 6341704)
- Keycap removal tool (6 tools) (P/N 1351717)
- Blank Keyboard Overlays (10) (AG only) Models A2X, B2X (P/N 6238058 <)
- Keyboard Overlays for Set-Up Functions (10) Models A1X, B1X (Italian, P/N 6457131); (French, P/N 6457133); (German, P/N 6457135); (Spanish, P/N 6457143) (AG only) Models A2X, B2X (French, P/N 6457134); (Spanish, P/N 6457144) <)
- Key Blanks for Security Keylock (10)\* for keys labelled A00-A99 (P/N 6238059); for keys labelled D00-D99 (P/N 64X9944)

\* Note: Duplicate keys may be made locally from these key blanks.

Customers may order these accessories through IBM Direct Response Operations by calling 1-800-IBM-2468.

### CUSTOMER REPLACEMENT PARTS

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material	
For Video	6317356
For Logic	6316868
For 122-key Typewriter	
Keyboard	7342987
(AG only)	
For IBM Enhanced Keyboard	
(102-key)	7342889<

**Keys:** The 3196 is shipped with two keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM

Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see Accessories.

### MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3196.

**Order Entry:** For shipment, specify Machine Element (P/N) Number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

### SITE PLANNING AND PREPARATION

These are the responsibility of the customer. The customer should have on hand, or should order the "IBM 3196 Display Station Description Manual" (Canada only) (GA18-2481) < (GA18-2521) for site planning and preparation work.

The video, logic, keyboard, video stand and line cord of the 3196 Display Station can be ordered as follows:

- Video (Green) (P/N 67X0218); Video (Amber-Gold) (P/N 67X0151) - Canada
- Video (Green) (P/N 67X0219) - Bermuda, Bahamas, Barbados,
- Video (Amber-Gold) (P/N 67X0152) - Colombia, Costa Rica, Dominican Republic, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Japan, Jamaica, Korea, Nicaragua, Netherlands Antilles, Mexico, Panama, Philippines, Surinam, Taiwan, Trinidad
- Video (Green) (P/N 67X0203); Video (Amber-Gold) (P/N 67X0204) - Bolivia
- Video (Green) (P/N 67X0222); Video (Amber-Gold) (P/N 67X0155) - Afghanistan, Bangladesh, Burma, Venezuela, China, Hong Kong, Malaysia, Sri Lanka, Thailand
- Video (Green) (P/N 67X0223); Video (Amber-Gold) (P/N 67X0156) - Argentina, Australia, Brunei, Chile, Indonesia, New Zealand, Peru, Paraguay, Singapore, Uruguay
- Logic (P/N 63X5252) - All AG-APG languages except Thai
- Logic (P/N 69X7855) - Thailand
- 122-Key Typewriter (P/N 1390573) - Canadian French
- 124-Key Typewriter (P/N 1390574) - Japanese Katakana
- 122-Key Typewriter (P/N 1390575) - Spanish Speaking
- 122-Key Typewriter (P/N 1390572) - US English
- 122-Key Typewriter (P/N 0989716) - Thai
- 102-Key IBM Enhanced: Keyboard (P/N 1390636) - US English
- 103-Key IBM Enhanced: Keyboard (P/N 1390637) - Canadian French
- 103-Key IBM Enhanced: Keyboard (P/N 1390639) - Spanish Speaking
- Video Stand (P/N 6238060) - All AG-APG countries
- Video Cable (P/N 6165557) - All AG-APG countries
- Line Cord (P/N 6952353) - Brunei, Malaysia, Singapore, Hong Kong
- Line Cord (P/N 6952317) - Afghanistan, Indonesia, Surinam
- Line Cord (P/N 6952308) - Australia, New Zealand
- Line Cord (P/N 6952371) - Chile
- Line Cord (P/N 6952285) - Argentina, Paraguay, Uruguay
- Line Cord (P/N 6952297) - Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Taiwan, Trinidad
- Line Cord (P/N 6952344) - Bangladesh, Burma, Sri Lanka
- Line Cord (P/N 6952397) - Peru, Thailand, Venezuela

## 3197 COLOR DISPLAY STATION MODEL C

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The IBM 3197 Model C Color Display Station is for use with the IBM System/36, System/38, and the IBM 5294 Remote Control Unit. The 3197 Model C is an attractively-priced, 14-inch color CRT display station with a smudge-resistant screen capable of displaying up to 1,920 characters. Standard features include host-directed alphanumeric print support for IBM ASCII printers, IBM 4201 Proprinter, IBM 4202 Proprinter XL, and IBM 5201 Models 1 and 2 Quietwriter, and the ability to support two display sessions or one display and one printer session concurrently.

### MODEL

**Model C1X:** Displays up to 1,920 characters and provides a 122-Key Typewriter Keyboard (Japan only) or 124-Key Japanese Katakana Typewriter Keyboard. (<)

**Model C2X:** Displays up to 1,920 characters and provides an IBM Enhanced Keyboard (103-key)(Japan only) or 104-Key Japanese Katakana IBM Enhanced Keyboard. (<)

Language option selected will be designated by the third character of the model number as follows:

D = Canadian French  
Y = English US  
K = Japanese Katakana  
S = Spanish Speaking  
O = Thai

### Limitations

- DisplayWrite/36: The 3197 Model C2X when attached via the IBM 5294 Remote Control Unit, does not support DisplayWrite/36.
- 4214 printer emulation does not support the Load Alternate Character (LAC) command. As a result, S/36 and S/38 applications which generate graphics for a 4214 printer are not supported on the 3197-D attached printers including:
  - S/36 Advanced Printer Function, Licensed Program (5727-AP1/AP6)
  - S/36 Business Graphics Utilities, Licensed Program (5727-BG1/BG6)
  - S/38 Advanced Printer Function Utility, Licensed Program (5714-UT2)
  - S/38 Business Graphics Utility, Licensed Program (5714-GP1)
  - S/38 GDDM
- Also, see "Prerequisites"
- (APG Only) > IBM 5294 Remote Control Unit does not support 3197 Mdl C2X. (<)

**Prerequisites:** The 3197 Models C1X, C2X attach to the S/36, S/38, or 5294 Remote Control Unit via IBM Cabling System, twinaxial cable, or equivalent.

Programming support or feature prerequisites are:

- S/36: Release 5.0 or higher
- S/38: Release 8.0 or higher
- 5294: For the 3197 Models C1X, either of the above releases.

(AG Only) > For the 3197 Model C20 Feature Code #3630 - IBM Enhanced Keyboard Support Feature. Note: Feature Code #3630 requires prerequisite #3611 - Feature Adapter Card A. (<)

- To attach the 3197 Model C2X to System/38, the WSCE (Workstation Controller Extended) is required.
- (APG Only) > Thai requires system RPQs as follows:

SYSTEM	RPQ
5360	8D0090
5362	8D0214
5364	--
5381/82	8D0270
5294	8D0139<)

### Printer Prerequisites:

**IBM Quietwriter(R) Printer 5201 Models 1 and 2:** An IBM "Quiet" electronic Font Type A is required for the attachment of the IBM Quietwriter(R) printer 5201 to the 3197 Model C Display Station. These fonts are available in a variety of typesstyles and pitches. Consult the "Supplies Reference Guide for Information Processing Equipment" (71K6162 or G570-2098).

An IBM "Quiet" Electronic Font in a choice of language character set cartridges is required for the attachment of the IBM Quietwriter(R) printer 5201 to the 3197-C.

The IBM "Quiet" Electronic Font Type A is a multilingual cartridge which supports the following languages. These fonts are available in a variety of typesstyles and pitches: Austrian German, Belgian, Canadian French, Danish, Dutch, Finnish/Swedish, French, Icelandic, Italian, Norwegian, Portuguese, Spanish, Swiss French/Swiss German, English UK, English US.

The following "Quiet" Electronic Font types are available in limited typesstyles and fonts:

LANGUAGE	FONT TYPE
Arabic	F
Greek	G
Hebrew	K
Turkish	C
Cyrillic	E
Latin 2/ROECE	
and Yugoslavian	B or BC

**IBM 4201 Proprinter and 4202 Proprinter XL:** When attached to the 3197 Model C Color Display Station, the 4201 Proprinter and 4202 Proprinter XL support the following languages: Austrian German, Belgian, Canadian French, Danish, Dutch, Finnish/Swedish, French, Italian, Norwegian, Portuguese, Spanish, Swiss French/Swiss German, English UK, English US, in addition to Greek, Arabic, Hebrew, Icelandic, Yugoslavian, Cyrillic, Latin 2/ROECE, and Turkish.

Refer to the IBM PC Printer and IBM Typewriter supplies catalogs, IBM Authorized dealers or IBM DIRECT for the appropriate part numbers, ordering procedures and prices.

When ordering any of the above printers for use with the 3197-C, order printer cable P/N 6457008.

**Customer Setup (CSU):** The 3197-C is a Customer Set-Up (CSU) machine. Set-up instructions are included with each machine as "3197 Model C Color Display Station Setup Instructions", (GA18-2558)

**HIGHLIGHTS**

- Improved price/performance -- low price with discounts for volume procurement
- Compatibility with existing 3179-2 application programs
- Functional Enhancements
  - Printer support for host-directed printing
    - ▲ 4201 Proprinter - multi-speed matrix
    - ▲ 4202 Proprinter XL - Multi-speed, wide platen
    - ▲ 5201 Models 1 and 2 Quietwriter non-impact, letter quality
  - Dual address terminal capability when printer is not in use
    - ▲ Two concurrent sessions to S/36 or S/38
- Choice of two keyboards
- Improved ergonomics/usability
  - Tilt/Swivel pedestal
  - Reduced weight
  - Reduced glare screen
  - Low-profile keyboard with 2 angles of inclination
  - 1,500-Keystroke Record/Play capability
  - Set-up function
  - Keylock
  - Enhanced diagnostics

The 3197-C supports the following national languages:

	3197-C1X	3197-C2X
Canadian French	X	X
English US	X	X
Japanese Katakana	X	X
Latin America Spanish	X	X
Thai	-	X

**DESCRIPTION**

The 3197 Model C Color Display Station displays up to 1,920 characters -- 24 lines of 80 characters each plus an Operator Information Area.

The printer port emulates IBM workstation printers in alphanumeric characters only (5256 or 4214-2) for attached printers which are IBM 4201 Proprinter, 4202 Proprinter XL, or 5201 Models 1 and 2 Quietwriter printer. The attached printer is addressable from the Host (programs and other workstations).

The dual address capability allows two concurrent sessions to S/36 or S/38. The prime workstation address is assigned to the display and the second is assigned to either the printer (D-P mode) or display (D-D mode). In D-D mode, two jobs are controlled concurrently and a user may alternate between screens from each session through the use of a "hot key".

(Canada only> With Canadian/French keyboard, displays additional 30 unique Canadian French characters (total 124-character set).<)  
 (Japan Only> With Japanese Katakana keyboards, displays 127-character set.<)

The 3197-C offers functions equivalent to the 3179-2. In addition, the 3197-C offers the ability to attach a choice of printers and to operate in dual terminal mode when the printer is not in use.

Cable-Thru with Auto-Termination and Screen Glare Reduction are standard. 188-character Multinational Character Set is available: providing 112 alphabetic, 10 numeric, and 66 special displayable characters. Display functions include: non-display, blinking, underscore, column separator, and reverse image (dark characters on a color background) on a field basis. An operator-adjustable

alarm is provided to alert the operator to special conditions. The low-profile keyboard with adjustable slope and 24 application-assigned command functions provides input and control flexibility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink. The operator can also elect to display the cursor locations (row/column) and screen attribute codes being utilized as well as set the audible alarm volume.

The 3197-C uses field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphanumeric, normal/intensified, and displayable/non-displayable.

The 3197-C consists of three workstation elements (WSEs): video, logic and keyboard elements.

**Operator Factors:** The 3197-C has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard slope can be adjusted by the user to 6 or 12 degrees.

**Field Editing:** Individual data input fields can be edited as Alpha-numeric, Alpha Only, Digits only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable and Monospace.

**Cabling:** The cable attachment between the 3197-C and other 5250 system components and/or systems may be made with IBM Cabling System, twinaxial cable, or equivalent. Cable connection: maximum length of any one twinaxial cable is 1,525m (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 3197-C. See "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337, for cabling information.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position.

These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

**Keyboards**

- 122-Key Typewriter Keyboard - Moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan Only> 124-key Japanese Katakana Typewriter keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)
- IBM Enhanced Keyboard (Except Canada> 103-Key<)  
 (Canada Only> 102-key English, 103-key Canadian/French<) typewriter-like layout, moveable with 48 alphanumeric keys, 24 control keys, 12 Program Function keys (24 functions) and 18 numeric pad keys.

- (Japan Only) > 104-key Japanese Katakana IBM Enhanced keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys. <)

### Physical Specifications:

	Width mm (in)	Depth mm (in)	Height mm (in)	Weight kg (lbs)
Video Element	383 (15.1)	405 (15.9)	345 (13.6)	12.7 (28.0)
Logic Element	300 (11.8)	290 (11.4)	47 (1.9)	1.2 ( 2.6)
Video, Pedestal, Logic	383 (15.1)	405 (15.9)	415 (16.3)	14.5 (31.9)
Keyboard Element- 122-Key (Except Canada)	561 (22.1)	230 (9.1)	30 (1.2)*	3.0 ( 6.6)
Keyboard Element- 103-Key<)	492 (19.4)	210 (8.3)	30 (1.2)*	2.4 ( 5.3)

\* At home row

**Operating Environment:** Operating environment of configurable I/O units are different.

- 3197-C
  - Temperature - Class C: 10 to 40.6 degrees C (50 to 105 degrees F)
  - Relative Humidity - 8 to 80 percent
- IBM 4201, 4202, 5201
  - Temperature - Class B: 15.6 to 32.2 degrees C (60 to 90 degrees F)
  - Relative Humidity - 20 to 80 percent

### Customer Responsibilities:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial set-up, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3197-C.
4. Physical set-up, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM Service for attachment of the 3197-C communications cable to an on-site serviced IBM control unit where customer access area is not provided.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR).
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "3197 Display Station Description Manual", GA18-2544, for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3197-C units for such use. The number of spare units is dependent upon the number of the 3197-C units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3197-C to enhance the availability to the customer. This has been done through routines and procedures in the "3197 Model C Color Display Station Problem Solving Guide" which is used by the customer.

**Publications:** The following publications are available from Mechanicsburg.

- 3197 Display Station Description, GA18-2544
- 3197 Model C Color Display Station User's Guide, GA18-2559\*
- 3197 Model C Color Display Station Setup Instructions, GA18-2558\*
- 3197 Model C Color Display Station Problem Solving Guide, GA18-2561\*
- Connecting the 3197 to System/36 and System/38, GA18-2629\*
- IBM Display Station Repair Center Maintenance Information Manual, SY18-2176

\* A copy is shipped with each machine.

**Note:** Customers should order the 3197 Display Station Description, GA18-2544, for system design considerations, configuring the host system, site planning and preparation work since this publication is not shipped with each machine. Customers may order the 3197 Display Station Repair Center Maintenance Information, SY18-2176, for repair. The other publications are shipped with the machine.

### SPECIFY

- Power - 100-127V AC, 1-phase, 3-wire, 50-60 Hz or 200-240V AC, 1-phase, 3-wire, 50-60 Hz
- Line Cord: A 2.8m (9.0 ft) line cord with nonlocking plug. The country number of the ordering country determines the default line for line cord and shipping group.

**RPQs:** Requests for RPQs will not be accepted for the 3197-C.

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**Cables:** IBM shielded twisted pair cable, twinaxial cable (or equivalent) is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Twinaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337.

ACCESSORY	P/N	MACHINE ELEMENT	P/N	COUNTRY
Clear lens keycaps (60)/ Paper Inserts, 150 light, 150 dark/removal tool	6341707	Video	6405302	Canada, Bahamas, Barbados, Bermuda, Jamaica, Surinam, Trinidad
Blank Keycaps light (60) and removal tool	1351710	Video	6405303	Columbia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Taiwan
Blank Keycaps dark (60) and removal tool	1351728			
Keycap Removal Tools (6)	1351717			
Paper Inserts (150 Light and 150 Gray)	6341704			
Blank Keyboard Overlays (10) for Model C1X	6341703			
Blank Keyboard Overlays (10) for Model C2X	6238058	Video	6405304	Afghanistan, China, Venezuela
<b>Keyboard Set-Up Overlays (10) - 3197 Model C1X</b>		Video	6405305	Bolivia, Ecuador, Philippines
English (122-Key Typewriter)	81x4362	Video	6405306	Australia, New Zealand
French (122-Key Typewriter)	81x4363			
Spanish (122-Key Typewriter)	81x4364	Video	6405307	Argentina, Bangladesh Brunei, Burma, Chile, Hong Kong, Indonesia, Malaysia, Paraguay, Peru, Sierra Leone, Singapore, Sri Lanka, Sudan, Thailand, Uruguay
<b>Keyboard Set-Up Overlays (10) - 3197 Model C2X</b>				
English (103-Key Enhanced)	81x4367			
French (103-Key Enhanced)	81x4368			
Spanish (103-Key Enhanced)	81x4369			
Printer Cable	6457008			
Key Blanks for Security Keylock (10)*		Logic	6457137	All countries except Thailand
for keys labeled A00-A99	6238059	Logic	81X4123	Thailand
for keys labeled D00-D99	64X9944	Keyboard	1390876	English US
		122-Key		
		Keyboard	1390940	English US
		102-Key		
		Keyboard	1390877	Canadian French
		122-Key		
		Keyboard	1390941	Canadian French
		103-Key		
		Keyboard	1390879	Spanish for Latin America
		122-Key		
		Keyboard	1390943	Spanish for Latin America
		103-Key		
		Keyboard	1390878	Japanese Katakana
		124-Key		
		Keyboard	1390942	Japanese Katakana
		104-Key		
		Keyboard	1391800	Thailand
		103-Key		
		Pedestal	6457031	All Countries
		Power Cord	6952297	Bolivia, Bermuda, Ecuador, Bahamas, Barbados, Costa Rica, Trinidad, Columbia, Guatemala, Dominican Rep., Haiti, Mexico, Netherlands Antilles, Jamaica, El Salvador, Korea, Nicaragua, Japan, Panama, Guyana Taiwan, Honduras, Canada, Philippines, Surinam
			6952285	Argentina, Paraguay, Uruguay
		Power Cord	6952308	Australia, New Zealand, China
		Power Cord	6952317	Afghanistan, Indonesia
		Power Cord	6952344	Bangladesh, Burma,

\* Duplicate Keys may be made locally from these key blanks.

For local charges, consult your Marketing Representative.

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material	
For Video	6317356
For Logic	69x8197
For Keyboard (122-Key)	7343198
For Keyboard (102-Key)	7342889

**Keys:** The 3197-C is shipped with two keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see "Accessories".

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3197-C.

**Order Entry:** For shipment, specify Machine Element (P/N) Number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic keyboard, pedestal and line cord of the 3197-C color Display Station can be ordered as follows:

**MACHINES**

Power Cord 6952353 Sri Lanka  
Brunei, Malaysia,  
Singapore, Hong Kong  
Power Cord 6952371 Chile  
Power Cord 6952397 Peru, Thailand,  
Venezuela  
Auto- 70X2370 All Countries  
Termination

Unit  
Video  
Cable

6405213 All Countries

**SUPPLIES (NONE)**

## 3197 DISPLAY STATION MODEL D

### PURPOSE

The 3197 Model D Display Station is for use with the IBM System/36, System/38, and the IBM 5294 Remote Control Unit. The 3197 Model D is an attractively-priced, 15-inch green phosphor monochrome CRT display station with a smudge-resistant screen capable of displaying up to 3,564 characters. Standard features include host-directed alphanumeric print support for IBM ASCII printers, IBM 4201 Proprinter, IBM 4202 Proprinter XL, and IBM 5201 Models 1 and 2 Quietwriter, and the ability to support two display sessions or one display and one printer session concurrently.

### MODEL

**Model D1X:** Displays up to 3,564 characters in one of three screen formats and provides a 122-Key Typewriter Keyboard(Japan only> or 124-Key Japanese Katakana Typewriter Keyboard <).

**Model D2X:** Displays up to 3,564 characters in one of three screen formats and provides an IBM Enhanced Keyboard (103-key)(Japan only> or 104-Key Japanese Katakana IBM Enhanced Keyboard <.)

Language option selected will be designated by the third character of the model number as follows:

D = Canadian French  
 Y = English US  
 K = Japanese Katakana  
 S = Spanish Speaking  
 O = Thai

### Limitations

- DisplayWrite/36: The 3197 Model D2X when attached via the IBM 5294 Remote Control Unit, does not support DisplayWrite/36.
- 4214 printer emulation does not support the Load Alternate Character (LAC) command. As a result, S/36 and S/38 applications which generate graphics for a 4214 printer are not supported on the 3197-C attached printers including:
  - S/36 Advanced Printer Function, Licensed Program (5727-AP1/AP6)
  - S/36 Business Graphics Utilities, Licensed Program (5727-BG1/BG6)
  - S/38 Advanced Printer Function Utility, Licensed Program (5714-UT2)
  - S/38 Business Graphics Utility, Licensed Program (5714-GP1)
  - S/38 GDDM
- Also, see "Prerequisites"
- (APG Only> IBM 5294 Remote Control Unit does not support 3197 Mdl D2X. <)
- The following is not available:
  - Reverse Image Key

**Prerequisites:** The 3197 Models D1X, D2X attach to the IBM S/36, S/38, or IBM 5294 Remote Control Unit via IBM Cabling System, twinaxial cable, or equivalent.

Programming support or feature prerequisites are:

- S/36: Release 5.0 or higher
  - S/38: Release 8.0 or higher
  - 5294: For the 3197 Models D1X, either of the above releases.
- (AG Only> For the 3197 Model D2X Feature Code #3630 - IBM Enhanced Keyboard Support Feature. Note: Feature Code

#3630 requires prerequisite #3611 - Feature Adapter Card A. <)

- To attach the 3197 Model D2X to System/38, the WSCE (Workstation Controller Extended) is required.
- (APG Only> Thai requires system RPQs as follows:

SYSTEM	RPQ
5360	8D0090
5362	8D0214
5364 --	
5381/82	8D0270
5294	8D0139<)

### Printer Prerequisites:

**IBM Quietwriter(R) Printer 5201 Models 1 and 2:** An IBM "Quiet" electronic Font Type A is required for the attachment of the IBM Quietwriter(R) printer 5201 to the 3197 Model D Display Station. These fonts are available in a variety of typesstyles and pitches. Consult the "Supplies Reference Guide for Information Processing Equipment" (71K6162 or G570-2098).

An IBM "Quiet" Electronic Font in a choice of language character set cartridges is required for the attachment of the IBM Quietwriter(R) printer 5201 to the 3197-D.

The IBM "Quiet" Electronic Font Type A is a multilingual cartridge which supports the following languages. These fonts are available in a variety of typesstyles and pitches: Austrian German, Belgian, Canadian French, Danish, Dutch, Finnish/Swedish, French, Icelandic, Italian, Norwegian, Portuguese, Spanish, Swiss French/Swiss French/Swiss German, English UK, English US.

The following "Quiet" Electronic Font types are available in limited typesstyles and fonts:

LANGUAGE	FONT TYPE
Arabic	F
Greek	G
Hebrew	K
Turkish	C
Cyrillic	E
Latin 2/ROECE	
and Yugoslavian	B or BC

**IBM 4201 Proprinter and 4202 Proprinter XL:** When attached to the 3197 Model D Display Station, the IBM 4201 Proprinter and 4202 Proprinter XL support the following languages: Austrian German, Belgian, Canadian French, Danish, Dutch, Finnish/Swedish, French, Italian, Norwegian, Portuguese, Spanish, Swiss French/Swiss German, English UK, English US, in addition to Greek, Arabic, Hebrew, Icelandic, Yugoslavian, Cyrillic, Latin 2/ROECE, and Turkish.

Refer to the IBM PC Printer and IBM Typewriter supplies catalogs, IBM Authorized dealers or IBM DIRECT for the appropriate part numbers, ordering procedures and prices.

When ordering any of the above printers for use with the 3197-D, order printer cable P/N 6457008.

**Customer Setup (CSU):** The 3197-D is a Customer Set-Up (CSU) machine. Set-up instructions are included with each machine as "3197 Model D Display Station Setup Instructions". (GA18-2546)

### HIGHLIGHTS

- Improved price/performance -- low price with discounts for volume procurement

- Compatibility with existing 3180-2 application programs
- Functional Enhancements
  - Printer support for host-directed printing
    - ▲ 4201 Proprinter - multi-speed matrix
    - ▲ 4202 Proprinter XL - multi-speed, wide platen
    - ▲ 5201 Models 1 and 2 Quietwriter non-impact, letter quality
  - Dual address terminal capability when printer is not in use
    - ▲ Two concurrent sessions to S/36 or S/38
- Choice of two keyboards
- Improved ergonomics/useability
  - Tilt/Swivel pedestal
  - Smaller size
  - Reduced weight
  - Reduced glare screen
  - Low-profile keyboard with 2 angles of inclination
  - 1,500-Keystroke Record/Play capability
  - Set-up function
  - Keylock
  - Enhanced diagnostics

The 3197-D supports the following national languages:

	3197-D1X	3197-D2X
Canadian French	X	X
English US	X	X
Japanese Katakana	X	X
Latin America Spanish	X	X
Thai	-	X

### DESCRIPTION

The 3197 Model D Display Station displays up to 3,564 characters in one of three selectable formats:

1. Up to 1,920 characters - 24 lines of 80 characters each
2. Up to 3,564 characters - 27 lines of 132 characters each
3. In dual address mode, up to 3,280 characters in two split screens - 24 lines of 80 characters each and 17 lines of 80 characters each.

In addition, each of the above formats provides operator message and status lines.

The printer port emulates IBM workstation printers in alphanumeric characters only (5256 or 4214-2) for attached printers which are IBM 4201 Proprinter, 4202 Proprinter XL, or 5201 Models 1 and 2 Quietwriter printer. The attached printer is addressable from the Host (programs and other workstations).

The dual address capability allows two concurrent sessions to S/36 or S/38. The prime workstation address is assigned to the display and the second is assigned to either the printer (D-P mode) or display (D-D mode). In D-D mode, two jobs are controlled concurrently in a split display through a "hot key".

(Canada only> With Canadian/French keyboard, displays additional 30 unique Canadian French characters (total 124-character set).<)  
(Japan Only> With Japanese Katakana keyboards, displays 127-character set).<)

The 3197-D offers functions equivalent to the 3180-2. In addition, the 3197-D offers the ability to attach a choice of printers and to operate in dual terminal mode when the printer is not in use.

Cable-Thru with Auto-Termination and Screen Glare Reduction are standard. 188-character Multi-national Character Set is available: providing 112 alphabetic, 10 numeric, and 66 special displayable characters. Display functions include: non-display, blinking, underscore, column separator, and reverse image (dark characters

on a color background) on a field basis. An operator-adjustable alarm is provided to alert the operator to special conditions. The low-profile keyboard with adjustable slope and 24 application-assigned command functions provides input and control flexibility. Easy-to-use select options, provided from the keyboard, allow the operator to utilize a block or underscore cursor, cursor blink or non-blink. The operator can also elect to display the cursor locations (row/column) and screen attribute codes being utilized as well as set the audible alarm volume.

The 3197-D uses field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/unprotected, alphanumeric, normal/intensified, and displayable/non-displayable.

The 3197-D consists of three workstation elements (WSEs): video, logic, and keyboard elements.

**Operator Factors:** The 3197-D has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the host is accomplished without refresh interruption (i.e., no blinking). An underline type cursor and a rectangular reverse video cursor, with blinking option are provided. An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable-connected keyboard can be moved and the video element can be tilted and swiveled to change the screen angle for the operator. The keyboard slope can be adjusted by the user to 6 or 12 degrees.

**Field Editing:** Individual data input fields can be edited as Alpha-numeric, Alpha Only, Digits only, Numeric Only, Signed Numeric, Field Exit Required, Right Adjust, Mandatory Entry, Mandatory Fill, Bypass, Auto Enter, Dup Enable and Monospace.

**Cabling:** The cable attachment between the 3197-D and other 5250 system components and/or systems may be made with IBM Cabling System, twinaxial cable, or equivalent. Cable connection: maximum length of any one twinaxial cable is 1,525m (5,000 feet). Up to seven workstations may be attached to a twinaxial cable via the Cable-Thru capability of the 3197-D. See "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337, for cabling information.

**Security Facilities:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of the data in the display terminal if the key is turned to the "LOCKED" position.

These capabilities and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to control access to data and audit of actions.

User management is responsible for evaluation, selection, and implementation of the security and auditability features, for administrative procedures, and for appropriate controls in application systems. If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography. For more information on data security controls, see "Data Security Controls and Procedures", G320-5649.

### Keyboards

- 122-Key Typewriter Keyboard - Moveable with 49 alphanumeric keys, 31 control keys, 24 individual Program Command keys, and 18 numeric pad keys.
- (Japan Only> 124-key Japanese Katakana Typewriter keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 32 control keys.<)
- IBM Enhanced Keyboard (Except Canada> 103-Key<)  
(Canada Only> 102-key English, 103-key Canadian/French<)  
typewriter-like layout, moveable with 48 alphanumeric keys, 24 control keys, 12 Program Function keys (24 functions) and 18 numeric pad keys.

## MACHINES

- (Japan Only) > 104-key Japanese Katakana IBM Enhanced keyboard - typewriter-like layout, moveable. Provides 4-level shift with 50 data keys and 24 control keys. <

### Physical Specifications:

	Width mm (in)	Depth mm (in)	Height mm (in)	Weight kg (lbs)
Video Element	361 (14.2)	337 (13.3)	316 (12.4)	8.0 (17.6)
Logic Element	300 (11.8)	290 (11.4)	47 (1.9)	1.2 (2.6)
Video, Pedestal, Logic	361 (14.2)	337 (13.3)	382 (15.0)	9.4 (20.7)
Keyboard Element- 122-Key	561 (22.1)	230 (9.1)	30 (1.2)*	3.0 (6.6)
(Except Canada)				
Keyboard Element- 103-Key<	492 (19.4)	210 (8.3)	30 (1.2)*	2.4 (5.3)

\* At home row

**Operating Environment:** Operating environment of configurable I/O units are different.

- 3197-D
  - Temperature - Class C: 10 to 40.6 degrees C (50 to 105 degrees F)
  - Relative Humidity - 8 to 80 percent
- IBM 4201, 4202, 5201
  - Temperature - Class B: 15.6 to 32.2 degrees C (60 to 90 degrees F)
  - Relative Humidity - 20 to 80 percent

### Customer Responsibilities:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of unit.
3. During initial set-up, install Repair Identification (RID) tags on each element (logic, video, and keyboard) of the 3197-D.
4. Physical set-up, connection of cables in customer access areas, switch settings and checkout.
5. Contacting IBM Service for attachment of the 3197-D communications cable to an on-site serviced IBM control unit where customer access area is not provided.
6. Determination of the required number of spares.
7. Performing customer problem analysis and resolution (CPAR).
8. Contacting IBM CE Branch Office if Customer On-Site Exchange service or IBM On-Site Exchange service is required.
9. Returning security keys to IBM if any exchange service of Logic WSE is required. (If the keys are not returned to IBM, the customer will be charged for the replacement of the security keys and locks on a time-and-material basis.)
10. Each customer must order the "3197 Display Station Description Manual", GA18-2544, for site planning and preparation works since this is not shipped with each machine.

**Spares:** It is recommended that the customer replace a failing workstation element with a spare element and that the customer be advised to purchase sufficient spare 3197-D units for such use. The number of spare units is dependent upon the number of the 3197-D units that the customer has installed, his application requirements, physical locations and layout. Determination of the required number of spares is a customer responsibility.

The customer should be advised to test spares for correct operation before putting them on the shelf. Spares may be ordered as a machine or individual workstation element.

**Customer Problem Analysis and Resolution (CPAR):** Functions have been designed into the 3197-D to enhance the availability to the customer. This has been done through routines and procedures in the "3197 Model D Display Station Problem Solving Guide" which is used by the customer.

**Publications:** The following publications are available from Mechanicsburg.

- 3197 Display Station Description, GA18-2544
- 3197 Model D Display Station User's Guide, GA18-2545\*
- 3197 Model D Display Station Setup Instructions, GA18-2546\*
- 3197 Model D Display Station Problem Solving Guide, GA18-2547\*
- Connecting the 3197 to System/36 and System/38, GA18-2629\*
- IBM Display Station Repair Center Maintenance Information Manual, SY18-2176

\* A copy is shipped with each machine.

**Note:** Customers should order the 3197 Display Station Description, GA18-2544, for system design considerations, configuring the host system, site planning and preparation work since this publication is not shipped with each machine. Customers may order the 3197 Display Station Repair Center Maintenance Information, SY18-2176, for repair. The other publications are shipped with the machine.

### SPECIFY

- Power - 100-127V AC, 1-phase, 3-wire, 50-60 Hz or 200-240V AC, 1-phase, 3-wire, 50-60 Hz
- Line Cord: A 2.8m (9.0 ft.) line cord with nonlocking plug. The country number of the ordering country determines the default line for line cord and shipping group.

**RPQs:** Requests for RPQs will not be accepted for the 3197-D.

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**Cables:** IBM shielded twisted pair cable, twinaxial cable (or equivalent) is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation with your country.

**Twinaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337.

## MACHINES

ACCESSORY	P/N	MACHINE ELEMENT	P/N	COUNTRY
Clear lens keycaps (60)/ Paper Inserts, 150 light, 150 dark/removal tool	6341707	Video with cable	6457150	Canada, Bahamas, Barbados, Bermuda, Guyana, Jamaica, Surinam, Trinidad
Blank Keycaps light (60) and removal tool	1351710			Bolivia, Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Japan, Korea, Mexico, Netherlands Antilles, Nicaragua, Panama, Philippines, Taiwan
Blank Keycaps dark (60) and removal tool	1351728	Video with cable	6457151	Argentina, Australia, Chile, Indonesia, New Zealand, Paraguay, Peru, Singapore, Uruguay
Keycap Removal Tools (6)	1351717			
Paper Inserts (150 Light and 150 Gray)	6341704			
Blank Keyboard Overlays (10) for Model D1X	6341703			
Blank Keyboard Overlays (10) for Model D2X	6238058			
<b>Keyboard Set-Up Overlays (10) - 3197 Model D1X</b>		Video with Cable	6457152	
English (122-Key Typewriter)	81x4124			
French (122-Key Typewriter)	81x4125			
Spanish (122-Key Typewriter)	81x4126			
<b>Keyboard Set-Up Overlays (10) - 3197 Model D2X</b>		Video with Cable	6457160	Afghanistan, Bangladesh, Brunei, Burma, China, Hong Kong, Malaysia, Sri Lanka, Thailand, Venezuela
English (103-Key Enhanced)	81x4129	Logic	6457137	All countries except Thailand
French (103-Key Enhanced)	81x4130	Logic	81X4123	Thailand
Spanish (103-Key Enhanced)	81x4131	Keyboard	1390876	English US
Printer Cable	6457008	Keyboard	1390940	English US
Key Blanks for Security Keylock (10)*		Keyboard	1390877	Canadian French
for keys labeled A00-A99	6238059	Keyboard	1390941	Canadian French
for keys labeled D00-D99	64X9944	Keyboard	1390879	Spanish for Latin America
* Duplicate Keys may be made locally from these key blanks.		Keyboard	1390943	Spanish for Latin America
For local charges, consult your Marketing Representative.		Keyboard	1390878	Japanese Katakana
		Keyboard	1390942	Japanese Katakana
		Keyboard	1391800	Thailand
		Keyboard	6457162	All Countries
		Keyboard	6952297	Bolivia, Bermuda, Ecuador, Bahamas, Barbados, Costa Rica, Trinidad, Columbia, Guatemala, Dominican Rep., Haiti, Mexico, Netherlands Antilles, Jamaica, El Salvador, Korea, Nicaragua, Japan, Panama, Guyana Taiwan, Honduras, Canada, Philippines, Surinam
		Power Cord	6952285	Argentina, Paraguay, Uruguay
		Power Cord	6952308	Australia, New Zealand, China
		Power Cord	6952317	Afghanistan, Indonesia
		Power Cord	6952344	Bangladesh, Burma, Sri Lanka
		Power Cord	6952353	Brunei, Malaysia,

## CUSTOMER REPLACEMENT PARTS

The following parts are not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material	
For Video	69x8245
For Logic	69x8197
For Keyboard (122-Key)	7343198
For Keyboard (102-Key)	7342889

**Keys:** The 3197-D is shipped with two keys. If keys are lost, the Logic Element should be sent to an IBM Repair Center or an IBM Service/Exchange Center for replacement of the locks and the keys. This service is available on an hourly service basis. For additional/replacement keys, see "Accessories".

## MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3197-D.

**Order Entry:** For shipment, specify Machine Element (P/N) Number at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

The video, logic, keyboard, pedestal and line cord of the 3197-D Display Station can be ordered as follows:

Power Cord 6952371	Singapore, Hong Kong	Termination
Power Cord 6952397	Chile	Unit
	Peru, Thailand,	
	Venezuela	
Auto-	70X2370 All Countries	

**SUPPLIES (NONE)**

## 3203 PRINTER

### PURPOSE

Printer output unit for S/38, all virtual storage S/370, 3031, 3032, 3033, 3081, 3083, 3084 Processors and the 3777 Communication Terminal.

### MODELS

**Model 1 001:** (NO LONGER AVAILABLE) 600 lpm -- native attachment on S/370 models 115 and 125 only.

**Model 2 002:** (NO LONGER AVAILABLE) 1,200 lpm -- native attachment on S/370 models 115 and 125 only.

**Model 3 003:** 1,000 lpm -- for use with a 3777 Communication Terminal model 1, 2 or 3.

**Model 4 004:** (NO LONGER AVAILABLE) 1,200 lpm -- native attachment on S/370 models 138 and 148 only.

**Model 5 005:** 1,200 lpm -- channel attachment on all Virtual Storage S/38, S/370, 3031, 3032, 3033, 3081, 3083, 3084, 3090, 4331, 4343 or 9370 Processor.

**Note:** All rated speeds are based on a 48-character set.

### Limitations:

1. Only marginally-punched, pin-fed, continuous forms can be used. For multiple part forms, it is preferred that both sides be securely fastened. However, when only one side is fastened, it must be the right side. No staples are permitted in the print train area.
2. The 3203 may be used to generate input in OCR applications; see M1270, 1275, 1287, 1288, 3881 and 3886 pages for information on acceptable characters and printing devices. For OCR applications, a special ribbon is recommended.
3. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use single-part forms for OCR printing.
4. Print quality and forms feeding varies with paper specifications, ribbon and number of copies. Multiple copy forms of more than four parts and forms with a first part heavier than 49 grams/sq. meter (13 lbs.) should be tested under operating conditions to determine that results are satisfactory for the user's application.
5. The 3203 may not be natively attached on a S/370 mdl 115, 125 with a natively attached 1403.

**Maximum:** A maximum of two 3203 mdl 5s can be attached to a S/38. See S/38 special features for attachment explanation. Only one 3203 mdl 1 or 2 can be natively attached to a S/370 mdl 115 or 125. Only one 3203 mdl 3 can be attached to a 3777. A maximum of two 3203 mdl 4s can be natively attached to a S/370 mdl 138 or 148. 3203 mdl 5 is limited only by the number of control unit positions available on a system channel.

**Prerequisites:** One 1416 Interchangeable Train Cartridge is required for each 3203. See M1416 page. In addition, the following are required, depending upon the 3203 mdl:

- **Model 1:** An Integrated 3203 Printer Attachment (#4650) on the 3115 or 3125. In addition, on the 3115 only, Integrated 3203/5203 Printer Prerequisite (#4653) is required. On the 3115 and 3125, specify #9770 for 3203 mdl 1.

- **Model 2:** #4650 on the 3115 or 3125. In addition on the 3115 only, #4653 is required. On the 3115 and 3125, specify #9771 for 3203 mdl 2.
- **Model 3:** A 3777 Communication Terminal mdl 1, 2 or 3. Note: See #2921 for 107 Katakana or #2873 for 127 Katakana in M1416 pages.
- **Model 5:** For S/38 --- 3203-5 Printer Attachment Feature (#1135 or #1136) on the S/38 system unit. See M5381 special features.

Cables for the 3203-5 must be ordered when attaching to a S/38. Refer to the "System/38 Installation Manual-Physical Planning" for ordering information.

### HIGHLIGHTS

- 132 print positions are standard.
- Horizontal spacing is 10 characters per inch.
- Vertical spacing is 6 or 8 lines per inch under operator control.
- Forms skipping and spacing are controlled by a forms control buffer. The carriage is a dual speed unit for mdl 1, 2, 4 and 5, and single speed for mdl 3.
- Normal skipping for mdl 1, 2, 4 and 5 is up to 24 inches per second with high speed skip of up to 55 inches per second after 6 lines have passed.
- The carriage speed for mdl 3 is up to 18 inches per second.
- A Universal Character Set buffer of 240 positions is standard.
- Use of graphics sets from 30 to 240 characters are allowed.
- Print speeds vary depending upon frequency of character repetition on the cartridge. One 1416 Interchangeable Train Cartridge is required for each 3203 Printer. The 3203 uses the proven train printing principle of the 1403 mdl N1 and maintains comparable high quality printing. Additionally, the 3203 has the capability of producing better copies.
- Continuous marginally punched forms are fed by a forms tractor. Maximum forms dimensions are: Width -- 20 inches; Length -- 24 inches. Minimum forms dimensions are: Width -- 3-1/2 inches; Length -- 3 inches. Mdl 1, 2, 4 and 5 of the 3203 have a power-assisted stacker.
- For full flexibility of column location for margins, 17-25/32 inches maximum width is recommended.
- If forms greater than 14 inches in length are used, the rear stacker enclosure must be opened. If forms greater than 17 inches in length are used, the forms compartment front door must be opened.
- See "Forms Design Manual", GA24-3488.

**Bibliography:** S/370 -- GC20-0001, S/3770 -- GA27-3097. System/38 -- "System/38 Installation Manual - Physical Planning" (GA21-9293), "3203-5 Printer Component Description and Operator's Guide" (GA33-1529), and "Form Design Reference Guide for Printers" (GA24-3488).

### SPECIFY

- (Canada only > Voltage (AC, 3-phase, 4-wire, 60 Hz): #9903 for 208V, or #9905 for 230V --- must be consistent with system voltage for the mdl 1, 2 or 4. <)
- (Except Canada > Power (AC, 3-phase):

Printer mdls  
1 and 2 Power  
provided by CPU\*:

220V 50 Hz #2815  
220V 50 Hz #2815  
220V 50 Hz #2815  
380V 50 Hz #2816  
380V 50 Hz #2816

208V 60 Hz #9903  
208V 60 Hz #9903  
208V 60 Hz #9903

Printer mdl 4  
Power Provided  
by CPU\*:

220V 50 Hz #2815  
220V 50 Hz #2815  
220V 50 Hz #2815  
220V 50 Hz #2815  
380V 50 Hz #2816

208V 60 Hz #9903  
208V 60 Hz #9903  
230V 60 Hz #9905

Printer mdl 3 (3777) & mdl 5: Specify according to customer's power source:

200V 50 Hz #2807  
220V 50 Hz #2815  
235V 50 Hz #2818  
380V 50 Hz #2816  
408V 50 Hz #2819

200V 60 Hz #2733  
208V 60 Hz #9903  
230V 60 Hz #9905

S/370 mdls  
115, 125  
Line Voltage  
(AC, 3-phase):

200V 50 Hz  
220V 50 Hz  
235V 50 Hz  
380V 50 Hz  
408V 50 Hz

S/370 mdls  
138, 148  
Line Voltage  
(AC, 3 phase):

200V 50 Hz  
220V 50 Hz  
235V 50 Hz  
408V 50 Hz  
380V 50 Hz

200V 60 Hz  
208V 60 Hz  
230V 60 Hz

Delta connected  
Delta connected  
Delta connected  
Y connected

Delta connected  
Delta connected  
Delta connected

\* 3203 mdls 1, 2 and 4 must be consistent with system voltage provided for the printer. <)

- Color: Mdls 1, 2, and 4 -- #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white. Mdl 3 -- blue is supplied as standard. Mdl 5 -- available from plant in pearl white only, MES orders will retain original color.
- Train Arrangement: See page TC 3203 in Type Catalog and M1416 pages for arrangements and required feature numbers.
- System Attachment: Specify #9501 for S/370 Mdl 115 Adapter, or #9502 for S/370 mdl 125 Adapter or #9503 for the first 3203 mdl 4 on S/370 mdl 138 or 148 and #9504 for the second 3203 mdl 4 on S/370 mdl 138 or 148.

S/38: Specify #9509 for the first 3203-5 to be installed at a customer's locations. This provides one tool kit required for CE maintenance. Another tool kit for the second 3203-5 installed on the system is not necessary. When rental machines are purchased, a tool kit can, if necessary, be ordered on a no-charge MES.

- Tool Kit - Mdl 5: Specify #9190 for first and fifth 3203 mdl 5 in a multiple rental machine installation. Specify #9191 for the second to fourth and sixth to ninth 3203 mdl 5 in a multiple rental machine installation. The #9191 eliminates tool kit shipment(s) to second to fourth and sixth to ninth printer. Check with Customer Engineering for additional tool kit requirement in multiple machine installation(s) or in case of machine transfer(s).
- Specify #9190 for all purchase machines.
- When installed rental 3203 mdl 5s are purchased, a tool kit has to be ordered on a no-charge MES for each printer requiring one.
- When installed rental 3203 mdl 5 out of multiple printer installation is transferred and becomes a first or fifth printer, a tool kit has to be ordered on a no-charge basis MES.
- On mdl upgrades from mdls 1, 2 or 4, no tool kit is to be specified.
- Machine Nomenclature:  
English #2927 Japanese #2930  
Canadian Fr #2935 Spanish #2931
- OCR: When OCR ribbons are used for either OCR printing or other applications, specify #9488. Field Installation: Yes.

## MODEL CONVERSIONS

Can be made in the field between models 1, 2, 4 and 5. Model upgrades of models 1 to 4 or 1 to 5 require multiple MES orders. Prices are additive. When upgrading from models 4 to 5 or 2 to 5, specify on MES orders the required power/voltage and frequency. For model 5, see above specify/feature codes.

## SPECIAL FEATURES

**Speed Enhancement (#6360):** (Mdl 3) Provides capability to operate the 3203 mdl 3 at 1,200 lpm. Maximum: One. Field Installation: Yes. Prerequisites: #5595 on the 3777.

## ACCESSORIES (NONE)

## SUPPLIES

**Ribbons:** Contact IBM.

## 3205 CONSOLE

### PURPOSE

A high quality, 14 inch, 1,920 character, cathode-ray tube (CRT) color display console for attachment to 4361 and 4381 processors which are equipped with an Operator Control Panel (OCP).

Console messages are displayed in four colors (white, red, blue, or green) according to the status of the protected and intensified attributes. This gives the operator better perception of the system status.

### BASE COLOR SUPPORT:

Protected and intensified	- White
Unprotected and intensified	- Red
Protected and normal intensity	- Blue
Unprotected and normal intensity	- Green

### MODELS

<b>Model 1</b>	<b>100</b>	Displays up to 1,920 characters and provides 122-key Typewriter Keyboard or 124-key Japanese Katakana Typewriter Keyboard.
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The country number of the ordering country determines the default for line cord and shipping group.

**Prerequisites:** An appropriate operator control panel (OCP) is required for the 3205 color display console on the 4361 and 4381 processors. (IOCP for the 4361 and OCP for the 4381). The IOCP/OCP provides the capability to power on/off, IML as well as providing a number of status indicators. See the M4361 and 4381 pages for details.

- For the 4361 -- Specify Code **#9325**, IOCP for the 3205 console, must be ordered on the 4361 for the attachment of the 3205. For details, see the M4361 pages.
- For the 4381 -- EC A20156 is required on the 4381 for the attachment of the 3205. It provides a standalone operator control panel. EC A20156 will be included on all 4381s shipped after (Canada only+ November 30, 1984 +) (Except Canada+ January 31, 1985 +) and must be ordered for all 4381s shipped before that date. Up to three additional 3205s may be attached to the 4381. They do not require an OCP. Each attached 3205 requires an available console position. Note that 3205 cannot be intermixed on the same processor with 3278-2A or 3279-2C consoles.

### HIGHLIGHTS

Displays characters in a maximum 7 x 14 dot matrix in the 9 x 16 contiguous box matrix, arranged in 24 rows of 80 characters each. Rows 1 through 20 are usable by the operator, rows 21 through 24 are used for system status information. A 94-character set is used, consisting of 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters.

The 3205 consists of five major units: Video, logic, keyboard, pedestal and line cord. Maintenance consists of repair by the CE of the failing unit.

A simple operator problem determination procedure is available, enabling the customer to isolate the failing unit and thereby allowing the Customer Engineer to bring the proper replacement part on the initial trip.

Elements used on other products are not interchangeable with units used on 3205.

The 3205 offers function equivalent to the 3279-2C color display console.

The 3205 keyboard emulates the existing 3278-2A and 3279-2C keyboards. The operator control panel (OCP) functions of the 3278-2A and 3279-2C are provided as a feature of the 4361 and EC A20156 of the 4381 processors.

A base color switch is provided allowing the 3205 to run in "monochrome mode". In this mode, fields are displayed in green for normal intensity and white for intensified.

**Operator Factors:** The 3205 has an etched screen, which minimizes glare and fingerprints. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Updating the screen from the processor is accomplished without refresh interruption (i.e., no blinking). An audible alarm is provided to alert the operator. The volume of the alarm can be adjusted by the operator. The cable connected keyboard can be moved and the video element can be tilted and swiveled to change the screen

angle for the operator. The keyboard is thin and the keyboard slope can be adjusted by the user to 6, 12, or 18 degrees.

**Security Facilities:** The 3205 is equipped with a standard two-position key lock switch to control access to the console. In addition, the System Control Programs supporting the 3205 contain functions that provide security, auditability, and control. User management is responsible for evaluation, selection, and implementation of security functions, for administrative procedures, and for appropriate controls in application systems.

**Warranty Service and Maintenance:** 3205 has a three month warranty on parts and labor.

The 3205 qualifies for an IBM maintenance agreement immediately following expiration of the warranty.

If an IBM maintenance agreement is not contracted for immediately following expiration of the service and parts warranty and the customer subsequently wants maintenance coverage, an inspection of the unit must be done by IBM at the customer's expense. In addition, all time and parts required to qualify the machine for maintenance agreement acceptability will be billed at IBM's then current rates and terms. The machine will then qualify for an IBM maintenance agreement coverage.

If a maintenance agreement is not in effect, service will be provided by IBM on an hourly services basis.

There is no regularly scheduled preventive maintenance recommended by IBM for the 3205.

**Keyboards:** Keyboards used on other products are not interchangeable with the keyboard used on the 3205.

**Bibliography:** *3205 Color Display Console Operator Reference and Problem Determination Guide* (GA18-2339) and *3205 Color Display Console Maintenance Information* (SY18-2121).

### SPECIFY

**Power:** 100-127V AC, 1-phase, 3-wire, 50-60 Hz. or 200-240V AC; 1-phase, 3-wire, 50-60 Hz.

**Line Cord:** 2.7 meter (9 foot), non-locking plug.

Specify as follows for the keyboard language.

English US **#2956**  
Canadian French **#2977**  
Japanese Katakana **#2973**  
Spanish Speaking **#2969**

**MODEL CONVERSION** (None)

**ACCESSORIES** (None)

**SUPPLIES** (None)

**3262 LINE PRINTER MODELS B1, C1**
**THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT**
**PURPOSE**

The 3262 mdl B1 is the printed output unit for S/34, 5360 and S/38.  
 The 3262 mdl C1 is the printed output unit for 5360.

**MODELS B1, C1**
**Model B1:** B01 650 lpm stand-alone

**Model C1:** C01 650 lpm CSU stand-alone

The above nominal rated speed is based on a standard 48-character set.

**Limitations:**

1. Only puffed, continuous forms can be used.
2. Both edges of the forms must be fastened in the forms tractors.
3. No staples are permitted in the areas exposed to the interchangeable print band.
4. Printer operation and print quality vary with paper and number of copies. Forms sets of more than four parts should be tested in operating conditions to verify that results are satisfactory.
5. Due to the complexity of certain characters on the multinational print bands, multiple part forms should be tested in operating conditions to ensure that results are satisfactory.
6. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results use 20-24 lb (75-90g/sg. m.) OCR bond in single-part forms. OCR forms utilizing other papers should be tested for satisfactory results with the user requirements. When reading 3262 documents on the 3886, Re-read on Reject capability and 3211/5211 compatibility (#9701) should be used on the 3886. OCR printing is limited to controlled DP room environment. Refer to system planning guides. The OCR feature is a prerequisite for OCR applications.

**Maximum:** Two 3262 Printers can attach to S/38, one 3262 Printer can attach to the 5360, one 3262 Printer can attach to S/34.

**Prerequisites:** A 3262 Attachment on the 5381 System Unit. Specify #1100 or #1110 on 5381. See 5381 Special Features.

A 3262 attachment on the 5360 System Unit. A 3262 printer attachment feature (#5830) is required on the 5360 System Unit. See 5360 special features. 5360-AXX mdls additionally require processor unit expansion A (#5732).

**Note:** If an installed 3262 mdl B1 is to be attached to a 5360 system unit, see specify #9876 in the M5360 pages. See 5360 special features. An installed 3262 mdl B1 can attach to the 5360 System via specify code #9030 which is a no-charge MES on the printer. No new orders will be accepted in AAS for a 3262 mdl B1 printer for attachment to the 5360 System.

A 3262 Printer Attachment Feature (#5815) and a 5211/3262 Base Printer Attachment (#1110) are required on the 5340 System Unit. See 5340 Special Features.

For Attached System Specify Printer System  
 Sales

3262 to System Prereq. Features Pages  
 mdl

B1 5381 #1100 or #9020 5381  
 #1110

B1 5340 #5815 & #9010 5340  
 #1110

B1 5360 #9876 #9030 5360

C1 5360-AXX #5830 & N/A 5360  
 #5732

C1 5360-BXX #5830 N/A 5360

**Customer Setup (CSU):** Yes, mdl C1 only.

**HIGHLIGHTS**

A universal character set buffer of 288 positions in the 3262 Attachment allows use of graphic sets of up to 288 characters. A general purpose optimized print band of 64 characters is available. (See 3262 in Type Catalog section.) The 64-character optimized print band can provide speeds up to a maximum of 625 lpm. Should specific application data have unique characteristics and not conform to the 64-character set optimized print band, the normal print bands will provide the following nominal rated speeds:

Nominal Rated  
 Speeds (lpm)

48-character set	650
64-character set	467
96-character set	364
128-character set	253
188-Character Set	131

132 print positions are standard. Horizontal spacing is 10 characters per inch. Vertical spacing is six or eight lines per inch under system control for S/38 and operator control for S/34 and 5360. Forms skipping and spacing are program controlled. The carriage is a single speed unit allowing skipping up to 20 inches per second. Continuous forms are fed by a forms tractor. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design considerations.

OCR capability is provided as a feature (#5460). See special features. The 48 and 128 Japan Katakana character bands containing numeric A or B font (10 numbers and 3 special characters) are available only as part of the feature. The new OCR feature is supported by the S/38 hardware and software beginning with Release 3.0. The OCR feature is also supported by the S/34 and 5360.

**Customer Setup (CSU):** The 3262 mdl C1 is designated as a customer setup device. The Marketing Representative must advise the customers of their responsibilities before receipt of the device.

**SPECIFY**

Unless indicated otherwise, these specify features are only available at time of manufacture.

- (Canada only > Power cord and plug: (120 V AC 1-phase, 3 wire, 60 Hz). The standard power cord is 4.3m (14 ft) long with locking plug; specify #9081. For a watertight power cord (S/38 only), specify #9080. <)
- (Except Canada > Power cord and plug: (AC, 1 phase - One must be specified). A power cord and plug are shipped with each machine from the plant of manufacture. The 3-digit

country code in the DP Machine Order Sheet will be used to select a power cord and plug of the specifications most commonly used in that WT country. If any exception to the above is required, a Country RPQ may be initiated.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
220V #2813	120V #9911
230V #2831	127V #2823
240V #2801<)	

### • Nomenclature:

Brazilian #2933	Japanese #2930
Canadian #2935	Spanish #2931
French	
English US #2924	

### • System Attachment: Specify one of the following:

Printer Model	System Attachment	Feature Code
3262 B1	S/34	#9010
3262 B1	S/38	#9020
3262 C1	5360	#9030
3262 B1*	from S/34 to S/38	remove #9010, add #9020
3262 B1*	from S/34 to 5360	remove #9010, add #9030

\* Used only when existing printer is moved to new CPU.

- Color: Background color is pearl white. A color accent must be specified. #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray or #9066 for pearl white.
- Interchangeable Print Band: (Plant only) See "Type Catalog" for print band arrays. When ordering, indicate one specify code for character set and one specify code for character height. When printing 8 lpi, 2.0mm (0.079 in.) character height is recommended.

Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a back up. When the customer installs this backup band, a replacement should be ordered via MES and the platen rotated as described in the instructions provided with the printer (exception is when OCR feature is installed). In this case the platen is single surface and cannot be rotated. The customer will be billed at the current accessory band price. Replacement and installation of the print band is the customer's responsibility. If the customer desires to have Customer Engineering replace or install the print band, the CE time will be billed to the customer.

Specify	Language
#2956	US/Canada EBCDIC
#2977	Canadian French
#2950	International
#2955	Japan
#2973	Japan Katakana*
#2961	Spanish Speaking
#2990	Multinational**
#9565	FORTAN***

\* Available only with 96-character set (#2770) or 128-character set (#2873) and 2.4mm (0.095 in.) character height (#9950).

\*\* Available only with 2.4mm (0.095 in.) character height (#9950), and 64-(#2768), 96-(#2770), and 188-(#9562) character set size.

\*\*\* Available on S/34 and 5360 with a 2.4mm (0.095 in.) character height (#9950), and 48-character set (#2767).

Specify	Character Set Size
#2767	48-character set
#2765	48-extended character set
#9521	60-character set S/38 special**
#2768	64-character set
#9523	64-character set (optimized)
#2770	96-character set*
#2779	116-Canadian French only*
#2873	128-Katakana only*
#9562	188-Multinational only*

\* Available only with 2.4mm (0.095 in.) character height (#9950).

\*\* Available only with US/Canada EBCDIC #2956. This specially designed belt (for S/38 only) will enable the user to print the S/38 Control Language characters.

Specify	Character Height
#9951*	2.0mm (0.079 in.)
#9950	2.4mm (0.095 in.)

\* Recommended for printing 8 lpi (25.4mm).

## SPECIAL FEATURES

**OCR Print Feature (#5460):** Provides for manual operator selection of print hammer controls for OCR applications. One of the following OCR print bands must be specified:

Specify	Band Description
#0901	48-Character OCR-AON(1)
#0902	48-Character OCR-BON(1)
#0903	128-Character OCR-BON(1,2)

### Notes:

1. Non-OCR characters are 2.4mm (0.095 in.) in height.
2. Available only for Japan (#2973).

Two OCR print bands (OCR numerics and 3 specials) will be shipped with #5460 in addition to the two standard bands shipped with the basic printer. The second band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES. Billing, warranty and ordering additional bands (see Accessories section) is the same as for standard bands shipped with the printer. Field Installation: CSU.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Print Bands:** Two print bands are included with the initial shipment. Additional print bands permit the customer to print more than one character set for various applications and can be interchangeably used with the band provided with the machine. OCR print bands are for use only with OCR Feature #5460. See "Type Catalog" for print band arrays. When ordering, indicate one feature code for character set size and one feature code for character height. Interchangeable Print Bands: See "Specify".

**Print Bands, Add'l:** Additional print bands permit the customer to print more than one character set and/or language. Can be inter-

changeably used with the band provided with the machine. See Type Catalog for print belt arrays. When ordering, order one feature code for character set size (Table A), one feature code for language (Table B), and one feature code for character set height (Table C). Order via MES for field installation. Only one band per MES. OCR print bands are for use only with the OCR Feature #5460.

Installation and replacement of these print bands is the customer's responsibility. If the customer desires to have Customer Engineering replace or install the print band, the CE time involved will be billed to the customer. OCR bands are available only for printers with OCR feature #5460. The specified language for OCR must be the same as specified for the bands ordered with the basic machine.

Table A

Character Set Size	Feature	Notes
48	#5940	
60 S/38 Special	#5943	(3)
64	#5944	
64 Optimized	#5946	
96	#5948	(2)
116 (Canadian/ French only)	#2878	(2)
128 (Katakana only)	#2875	(2)
188 (Multinational only)	#5962	(2)
48 Numeral A-Font	#5974	(2,5)
48 Numeral B-Font	#5975	(2,4)
128 Numeral B-Font	#0703	(2)

Notes:

1. Available only with Austria/Germany (#2757).
2. Available only with 2.4mm (0.095 in.) character height (#5950).
3. Available only with US/Canada EBCDIC #2756. This specially designed belt (for S/38 only) will enable the user to print the S/38 control language characters.
4. Available only with #2755, #2756, #2768.
5. Available only with #2766, #2761.

Table B

Language	Feature	Notes
Canada-French	#2777	
Canada/US EBCDIC	#2756	
International	#2750	
Japan-English	#2755	

Japan Katakana	#2773	(3)
Spanish Speaking	#2761	
Brazil	#2775	
Multinational	#2790	(1)
FORTTRAN	#5965	(2)

Notes:

1. Available only with 2.4mm (0.095 in.) character height #5950 and 64- (#5944), 96- (#5948), and 188- (#5962) character set size.
2. Available only with 48-character set (#5940) and 2.4mm (0.095 in.) character height (#5950).
3. Available only with 96- (#5948) and 128-character set size (#2875).

Table C

Character Height	Feature
2.4mm (0.095 in.)	#5950
2.0mm (0.079 in.)	#5951*

\* Recommended for printing 8 lines/25.4mm (inch).

SUPPLIES

**Ribbons:** A black ribbon, P/N 7819690, or equivalent, is required. An OCR ribbon P/N 032877 or equivalent is required with OCR feature #5460.

**Convenience Kits:** The following kits may be ordered with the initial machine shipment. For additional information, see your Country DP Supplies Coordinator.

Convenience Kit for 5360 or S/38 With Magazine Feature (#8010):

This kit provides the basic start-up supplies plus application set-up and programming tools at the same cost as the supplies sold separately. Each kit contains: 10 printer ribbons, 50 1,024-byte double density diskettes, and 5 diskette magazines. Also included, free of charge, are the following: Fiftifile, proofreading ruler, printer spacing pad, forms ruler, flow chart template and RPG debugging template.

Convenience Kit for 5360 or S/38 Without Magazine Feature (#8012)

This kit provides the basic start-up supplies plus application set-up and programming tools at the same cost as the supplies sold separately. Each kit contains: 10 printer ribbons and 50 1,024-byte double density diskettes. Also included, free of charge, are the following: Fiftifile, proofreading ruler, printer spacing pad, forms ruler, flow chart template and RPG debugging template.

## 3262 LINE PRINTER MODELS 1, 2, 3, 11, 12, 13

### PURPOSE

A series of line printers for attachment to the 3274, 3276, 3601, 3602, 3694, 3777, 4331, 4361, 4701, 8100, 8775 or 9370.

### MODELS 1, 2, 3, 11, 12, 13

**Model 001:** 4331/4361 Processor via Display Printer Adapter.

**Model 002:** 8100 Information System via the loop (9.6 and 38.4 KB). 3777-4 Communication Terminal via direct attachment (38.4 KB).

**Model 003:** 3601 Controller mdls 3A or 3B, 3602 Finance Communication Controller, 4701 Finance Communication Controller mdl 1, 3694 Document Processor, 3274 Control Unit, 4361 Display Printer Adapter or Workstation Adapter, 9370 Processor via Workstation Subsystem Controller, and S/3 via the 3274 Control Unit.

**Model 011:** 4331/4361 Processor via Display Printer Adapter.

**Model 012:** 8100 Information System via the loop (9.6 and 38.4 KB). 3777-4 Communication Terminal via direct attachment (38.4 KB).

**Model 013:** 3601 Controller mdls 3A or 3B, 3602 Finance Communication Controller, 4701 Finance Communication Controller mdl 1 or 2, 3694 Document Processor, 3274 Control Unit, 4361 Display Printer Adapter or Workstation Adapter, 9370 Processor via Workstation Subsystem Controller, 3276 Control Unit Display Station and S/3 via the 3276 Control Unit Display station and 8775 Display Station via Printer Attachment feature (#5580).

All models can attach to appropriate processor or controller using the IBM cabling system.

### Limitations:

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be engaged by the forms tractor pin feed.
3. No staples are permitted in the areas exposed to the interchangeable print belt.
4. Printer operation and print quality vary with paper and number of copies. Form sets of more than four parts (one part with specify #9529 or #0993 and one part with 128-character text print bands) should be tested in operating conditions to verify that results are satisfactory. Maximum forms thickness is 0.51mm (0.020 in.).
5. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use in single-part forms for OCR printing. OCR forms utilizing other papers should be tested for satisfactory results with user requirements. When reading 3262 documents on the 3886, reread on reject capability and 3211/5211 Compatibility (#9701) should be used on the 3886. OCR printing is limited to controlled DP room environment. Refer to "Site Planning and Preparation Guide", GA24-3734. The OCR feature #5450 is a prerequisite for OCR Applications.

**Maximum:** Up to two 3262 Printers (mdl 1 and/or 11) may be attached to a 4331/4361 Processor --- for mdl 2s/12s, see 3777 mdl 4, 8101, 8130 or 8140 --- for mdl 3s/13s, see 3274 mdl 1A, 1B, 1C, 1D, 3274 mdl 51C, 3602, 3694 or 4701 --- for mdl 13s, see 3276.

**Prerequisites:** Mdl 1 and 11 -- a position on the 4331 standard Display/Printer Adapter or the Display/Printer Adapter Expansion (#2001) on the 4331 Mdl Group 1 or 2 --- see M4331 pages or the 4361 Display Printer Adapter.

Mdl 2 and 12 -- a position on an 8100 system loop --- see 8101, 8130 or 8140, or direct attachment to a 3777 mdl 4 --- see 3777 mdl 4.

Mdl 3 and 13 -- an available Category A terminal port on a 3274, 9370 Processor via Workstation Subsystem Controller, 4361 Display Printer Adapter or Workstation Adapter or a Device Cluster Adapter (#3101) on a 3601 mdl 3A or 3B, 3602, 3694, 8775 Display Station via the Printer Attachment feature (#5580) or 4701 --- see M3274, 3601, 3602, 3694, 4701, 8775 or 9370 pages.

Mdl 13 -- an available terminal port on a 3276 --- see M3276 pages.

**Customer Setup (CSU):** The 3262 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility.

### HIGHLIGHTS

132 print positions are standard. Horizontal spacing is 10 characters per 25.4mm. Vertical spacing is 3, 4, 6 or 8 lines per 25.4mm for the mdls 1 and 11 under system control. Forms skipping and spacing are program controlled. The carriage is a single speed unit allowing skipping up to 508mm (20 in.) per second. Continuous forms are fed by a forms tractor, which accepts forms of up to a maximum of 406.4mm (16 in.) wide. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design considerations. 288 character Universal Character Set Buffer is standard (for mdls 1 and 11 only).

**Print Format Compatibility:** Compatibility Options for 3270 Data Stream (Non-SCS) Operation mdls 3 and 13 only. Differences in the functional responses of the 3287, 3289 and 3262 result in differences in the format of the printed output. A no-charge RPQ MM4370 can be ordered for print format compatibility when compared to a 3287 or 3289 printer. For additional information refer to the "3262 mdl 3 or 13 Component Description Manual", GA24-3741-1" or the DP-Hone/Smart Data Base.

**Decompaction (mdls 2, 12):** Provides the decompaction function associated with the receipt of a compaction data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. The function is dependent upon receipt from the host of a decompaction table corresponding to the compaction table used by the host programming in creating the compacted data stream. The master character count may range from 3 to 16.

**Decompression (mdls 2, 12):** Provides expansion of compressed data streams whereby a two byte identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters and one byte is substituted for each occurrence of two or more consecutive blank characters.

**Performance Considerations:** Actual printer throughput is dependent upon operational and programming characteristics. The following factors must be considered in determining actual throughput:

- System Configuration
  - Loop speed (mdls 2 and 12 on S/8100)
  - Transmission speeds (mdls 2 and 12 on 3777-4)
  - Multiple device operational loads
- Host Link Communications Facility
  - Communication protocol (BSC/SDLC)
  - Transmission line speed
  - Compression and compaction characteristics
- Application Processing
  - Data organization
  - Output format: skipping --- spacing --- print line length
  - Character set size of print band application program.

**Mdl 3 and 13 Performance Considerations:** In addition to the performance considerations listed above, the 3262 mdls 003 and 013 are sensitive to data stream characteristics. Optimum throughput can be achieved using SN LU-1-Datastreams. Significantly less than maximum rated speed may be experienced when using BSC or DSC (SNA-LU-3) Datastreams. Refer to the "Component Description Manual" for additional details.

The FIVE3270 SE aid is available to estimate printer performance for the particular environment in which the mdls 3 and 13 will be installed. Use of the aid is essential for understanding the effects of transmission speed, data stream protocol, and message sized on printer throughput.

**Print Bands:** Operator-interchangeable print bands are available which offer the following character sets and maximum rated speeds:

	Maximum Rated Speed (lpm)	
	Mdl 1,2,3	Mdl 11,12,13
48-char. set	650	325
64-char. set	467	230
96-char. set		
(94 printable)	364	180
116/128-char. set	253	125

A general-purpose optimized 63-character set print band is available which can provide speeds of up to 310 lpm on the mdls 11 and 12 and up to 625 lpm on the mdls 1 and 2. The optimized 63-character print band can be used on the mdls 003 and 013. However, performance may be limited by system configurations and other factors described under Performance Considerations. See "Component Description Manual", GA24-3741.

Two special 128-character Distributed Office print bands are available on mdls 2 and 12:

- North American-English US, Canadian French.
- Iberian-Brazil, Spanish Speaking.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

**Customer Responsibilities:** The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 3262.
- Physical setup, connection of cables, switch settings and checkout, with the exception that the CE will connect the printer communication cable to the 3777-4.
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Use and follow the problem determination procedures and fill out trouble report prior to calling IBM for service.
- Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
- Replacing a worn print band with the spare provided and rotating the platen per the instructions provided with the printer, and order another spare band.
- Procurement, installation, and management of the loop network (see "Accessories").

### SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- (Canada only > The basic machine is shipped with the following: Voltage 120V, AC, 1-phase, 3-wire, 60 Hz, power plug non-locking, power cable length 4.3m (14 ft).
- The following options may be specified: #9081 for locking plug, #9080 water tight plug (required where connection is beneath raised floor) or #9511 for 1.8m (6 ft) cable length. <)
- (Except Canada > Power (AC, 1-phase): Specify one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #9911*
220V #2813	127V #2823
230V #2821	
240V #2801	

\* Includes 115V.

For Japan, specify #9890 for locking plug or #9891 for non-locking plug for voltages under 200V. For other countries, a power plug is selected which matches the most commonly used power supply in each country. If an exception to the above is required, a Country RPQ may be initiated.

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated. <)

- Power Cord: If standard 4.3m (14.0 ft) power cord is not required, specify #9511 for 1.8m (6.0 ft) power cord.
- Color: Background color is pearl white. One color accent panel must be specified: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.
- Machine Nomenclature: One must be specified.

Brazilian	#2933
Canadian French	#2935
English US	#2924
Japanese	#2930
Spanish	#2931

- Cables: For the mdls 1, 3, 11 and 13, the customer is responsible for procurement, maintenance and installation of signal cable. See Accessories for ordering instructions. For the mdls 2 and 12, a 1.8m (6.0 ft) communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link attached loop. If the standard length cable is not desired, specify #9405 for a 4.3m cable.
- Print Band Character Set: Select one band only by specifying one number from Group A (character set), one number from Group B (language) and one number from Group C (character set height). When printing 8 lpi, 2.0mm (0.079 in.) character height is recommended. Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a back-up. When the customer installs this back-up band, a replacement should be ordered via an MES. The platen must be rotated periodically as described in the operators manual provided with the printer. The customer will be billed at the current accessory band price. If the customer desires to have CE replace or install the print band, or rotate the platen, the CE time involved will be billed to the customer. See Print Band, Add'l, in "Accessories" if more than one band is required.

Group A

Specify Number	Character Set
#2767	48-character set EBCDIC
#2765	48-extended character set (52 graphics)
#2768	64-character set EBCDIC
#9523	63-character set EBCDIC (optimized)
#2770*	96-character set EBCDIC (94 printable)
#2725*	128-character set text (mdls 3 and 13 only)
#2729*	116-character set (Canadian French only mdls 3 and 13 only)
#9529*	North American-128-character Distributed Office (mdls 2 and 12 only)
#0993*	Iberian-128-character Distributed Office (mdls 2 and 12 only)

International Language Code is not available on the 128-character set print bands for mdls 002 and 012.

\* Available only with 2.4mm (0.095 in.) character height #9950.

Group B

Specify Number	Language
#2950	International
#2955	Japanese English
#2956	English US
#2961	Spanish Speaking
#2973	Japanese Katakana
#2975	Brazilian
#2977	Canadian French

Group C

Specify Number	Character Set Height
#9950	2.4mm (0.095 in.)
#9951*	2.0mm (0.079 in.)

\* Recommended for printing 8 lpi (25.4mm).

If Spanish N (with Tilde) printing capability is desired on the print band provided with the 3262, order #2961 and one number from Group A (character set) and one number from Group B (character set height).

Group A

Specify Number	Character Set
#2767	48-Character Set
#2768	64-Character Set
#2770	96-Character Set
#2779*	116-Character set (Canadian French only)
#2873*	128-Character set (Japanese Katakana only)

\* Available only with 2.4mm (0.095 in.) character height (#9950).

Group B

Specify Number	Character Set Height
#9950	2.4mm (0.095 in.)
#9951*	2.0mm (0.079 in.)

\* Recommended for printing 8 lpi (25.4mm).

**Character Print Operations:** For mdls 3 and 13 only, the basic machine is shipped for use with a program which assumes the buffer size to be 1,920 bytes while using Erase/Write Alternate Command. Specify the following options only to alter the basic machine:

- #9200 - 960-Character Print Operation: For use with a program which assumes the buffer size is 960 bytes while using Erase/Write Alternate Command.
- #9202 - 2,560-Character Print Operation: For use with a program which assumes the buffer size is 2,560 bytes while using Erase/Write Alternate Command.
- #9203 - 3,440-Character Print Operation: For use with a program which assumes the buffer size is 3,440 bytes while using Erase/Write Alternate Command.
- #9204 - 3,564 Character Print Operation: For use with a program which assumes the buffer size is 3,564 bytes while using Erase/Write Alternate Command. Limitations: This specify code is not valid when the 3262 mdls 3 or 13 is attached to a 3274 Display Controller with Configuration Support A #9110.

**Note:** To provide compatibility with programs written for 3271/3272 using Erase/Write Command, #9200 provides 480-character print operation. Specify #9202, #9203 and #9204 provide 1,920-character print operation. Allowable usage in SNA character string of the full buffer varies according to the control unit (3274 or 3276) to which the printer is attached and to programming consideration. See "IBM Information Display Component Description", GA27-2749. Copy operation from larger screen size display to smaller printer buffer is not accepted.

SPECIAL FEATURES

**Audible Alarm Feature (#1090):** Audibly notifies the operator that manual intervention or problem determination is required. On mdls 2, 3, 12 and 13, the alarm sounds when the printer receives the SCS "Bell Code" or when the "Check Indicator" goes on. On mdls 1 and 11, the alarm is under printer control and is activated only when the "Check Indicator" is turned on. A switch on the operator's panel can disable the alarm. Maximum: One. Field Installation: Yes.

**OCR Print Feature (#5450):** Provides a manual selection for OCR print applications.

Language Code	OCR-AON	OCR-BON
#2955	No	Yes
#2956	Yes	Yes
#2961	Yes	No
#2973	No	Yes

One of the following OCR bands (numerics only) must also be specified.

- #0901 OCR-AON 48 Character Set (1)
- #0902 OCR-BON 48 Character Set (1)
- #0903 OCR-BON 128 Katakana Set (1) (2)

Note(s):

1. Non-OCR characters are 2.4mm (0.095 in.) in height.
2. Available only for Japanese #2973

Two OCR print bands (OCR numerics and specials only) will be shipped with #5450, in addition to the bands shipped with the basic printer. The second band will be a spare for use by the customer for backup. When the customer installs the backup band, a replacement should be ordered via an MES, billing, warranty and ordering additional bands is the same as for non-OCR bands shipped with the printer. Field Installation: Yes.

## MODEL CONVERSIONS

Model 11 to a mdl 1, mdl 12 to a mdl 2, and mdl 13 to mdl 3 are field installable.

## ACCESSORIES

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted-pair Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", (GA27-3361). For pricing and ordering information, refer to the System Supplies operation within your country.

**Coaxial Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and "Coaxial Cable and Accessories Manual", GA27-2805.

Item Number	Description
Assm 2577672	Cable Assembly In-Door
Bulk 0323921	Coax Wire (2)
P/N 1836418	Connector Kit (2)
Assm 1833108	Cable Assembly Out-Door
Bulk 5252750	Coax Wire (3)
P/N 1836419	Connector Kit (3)
P/N 1833104	Station Protector Kit, Carbon (5)
P/N 2621414	Modification Kit (4)
P/N 1833106	Station Protector Attachment Kit (6)
P/N 1833104	Station Protector Kit, Carbon (5)
P/N 5252772	Station Protector Element Carbon (7)
P/N 5252643	Adapter (8)
P/N 1830818	Station Protection Kit, Gas (5)
P/N 5252899	Station Protector Element, Gas (7)

### Notes:

- Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.
- Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
- Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
- Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
- Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.

- Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
- Replacement station protector elements.
- Use to join two #2577672 or two #1833108 cable assemblies together.

**Print Band, Add'l:** Additional print bands permit the customer to print more than one character set and/or language. Can be used interchangeably with the band provided with the machine. OCR bands are available for printers with OCR feature #5450, and for language codes #2755, #2756, #2757, #2758, #2761, #2762, #2763, #2764, #2773, or #2788. The specified languages for OCR must be the same as specified for the bands ordered with the basic machine. When ordering, order one feature for character set size (Table A), one feature code for language (Table B), and one feature code for character set height (Table C). Order via MES. Only one band per MES. Installation and replacement of these print bands is the customer's responsibility. If the customer desires to have Customer Engineering replace or install the print band, the CE time will be billed to the customer. Additional 128-character distributed office print bands are available for countries as described on page M3262.1.

Table A

Character Set	Feature
48 EBCDIC	#5940
48 OCR-AON(numeric & specials)*	#5974
48 OCR-BON(numeric & specials)*	#5975
64 EBCDIC	#5944
63 Optimized EBCDIC	#5946
96 (94 printable) EBCDIC*	#5948
128 TEXT(mdls 3 and 13 only)	#5961*
116 (Canadian French only)*	#2878
128 (Katakana only)*	#2875
128 OCR-BON Katakana	#0703
North American 128 Distributed Office (mdls 2 and 12 only)	#5962
Iberian 128 Distributed Office (mdls 2 and 12 only)	#0893

\* Available only with 2.4mm (0.095 in.) character height.

Table B\*\*

Language Group	Feature Number
Brazilian**	#2775
Canadian French	#2777
Canadian/US EBCDIC	#2756
English US	#2756
International	#2750
Japanese English	#2755
Japanese Katakana*	#2773
Spanish Speaking	#2761

\* Available only with 128-character set #2875.

\*\* Not available with 128-character set #2875.

\*\* For mdls 2, 3, 12 and 13, only one Language Code (Table B) per printer. Multiple languages on one printer are on an RPQ basis only.

Table C

Character Height	Feature Number
2.0mm (0.079 in.)	#5951*
2.4mm (0.095 in.)	#5950

\* Recommended for printing 8 lines/25.4mm (inch).

**IBM** IBM Canada Ltd.

**MACHINES**

**M 3262.8**  
DEC 86

**SUPPLIES**

**Ribbons:** A black ribbon, P/N 7819690, or equivalent, is required.  
An OCR ribbon P/N 7032877 or equivalent is required with OCR feature #5450.

## 3262 LINE PRINTER MODEL 5

### PURPOSE

Printer output for attachment to a processor channel.

### MODEL 5

Model 5 005

Printer output unit for 4300 Processors, all Virtual Storage S/370 (except 155II or 165II), 3031, 3032, 3033, 3081, 3083, 3084, 3090 or 9370 Processors.

### Limitations

1. Only pinfed, continuous forms can be used.
2. Both edges of the forms must be engaged by the forms tractor pin feed.
3. No staples are permitted in the areas exposed to the interchangeable print band.
4. Printer operation and print quality vary with paper and number of copies. Form sets of more than four parts (and one part with 128 character text print bands) should be tested under operating conditions to verify that results are satisfactory. Maximum forms thickness is 0.51mm (0.020 inch).
5. Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results, use in single-part forms for OCR printing. OCR forms utilizing other papers should be tested for satisfactory results with user requirements. When reading 3262 documents on the 3886, reread on reject capability and 3211/5211 Compatibility (#9701) should be used on the 3886. OCR printing is limited to controlled DP room environment. The OCR feature #5450 is a prerequisite for OCR Applications.

**Maximum:** The number of 3262 mdl 5s that can be attached is limited only by the number of control unit positions available on the system channel. Channel loading and system configuration may affect printer performance.

**Prerequisites:** An available control unit position on a system channel.

### HIGHLIGHTS

- 132 print positions are standard.
- Horizontal spacing is 10 characters per 25.4mm.
- A fine horizontal vernier adjustment is provided on the mdl 5 to allow the operator to horizontally position printed characters in predetermined print positions.
- The maximum amount of movement is the width of one and one half print positions 3.8mm (0.150 inch) at 10 characters per 25.4mm (inch).
- Vertical spacing is 6 or 8 lines per 25.4mm (inch) under system control.
- Forms skipping and spacing are program controlled.
- The forms carriage is a single speed unit allowing skipping up to 508mm (20 inches) per second.
- Continuous forms are fed by a forms tractor, which accepts forms of up to a maximum of 406.4mm (16 inches) wide. See

"Forms Design Reference Guide for Printers", GA24-3488, for forms design considerations.

**Performance Considerations:** Actual printer throughput is dependent upon operational and programming characteristics. The following factors must be considered in determining actual throughput:

- System Configuration
- Application Processing
  - Data organization
  - Output format:
    - skipping -- spacing -- print line length
    - Character set size of print band application program.

**Programming Support:** For 3262 mdl 5 printers that are shipped prior to the General Availability dates of MVS/SP Version 1 support of the 3262-5, a no-charge RPQ S00538 must be ordered via MES and installed to operate on a MVS/SP Version 1 system. RPQ S00538 activates the mode selector switch so that in addition to system generating the 3262 mdl 5 printer as a 3262 mdl 001 and 011 for DOS/VSE, VM/SP and OS/VS1, it can be system-generated as a 4248 printer for MVS/SP Version 1. 3262 mdl 5 printers that are shipped after the MVS/SP Version 1 General Availability dates will operate in either mode and will not require an RPQ.

**Print Bands:** Operator interchangeable print bands are available which offer the following character sets and nominal speeds:

Nominal Speed (lpm)

48-character set	650
64-character set	466
96-character set	363
116/128-character set	252

A general purpose optimized 63-character set print band is available which can provide speeds of up to 625 lpm. The expected performance of the 63-character optimized band is not determinable unless sample data streams are printed. It is possible that the performance could be less than the 64-character band if the low frequency occurring characters on the 63-character band are used at a higher rate.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities" below.

### Customer Responsibilities:

The customer is responsible for:

1. Receipt at the customer's receiving dock, unpacking and placement of the 3262.
2. Notify IBM of intent to relocate and follow IBM instructions for relocation.
3. Use and follow the problem determination procedures and fill out Trouble Report Form prior to calling IBM for service.
4. Packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
5. Replacing a worn print band with the spare provided and ordering another spare band.
6. Rotating the platen per the instructions provided with the printer. The special platen for OCR cannot be rotated when the OCR feature #5450 is installed.

Publications: GC20-0001

## SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- (Canada only) The basic machine is shipped with 120V, AC, 1-phase, 3-wire, 60 Hz, watertight power plug (Russell and Stoll). Power cord length is 4.3m (14 foot). If a 1.8m (6 foot) power cord is desired, specify #9986. <
- (Except Canada) Power (AC, 1-phase): Specify one of the following:

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	110V	#2822
200V	#2806	120V	#9911*
220V	#2813	127V	#2823
230V	#2821		
240V	#2801		

\* Includes 115V

- Power Cord: If standard 4.3 meter (14 foot) power cord is not required, specify #9986 for 1.8 meter (6 foot) power cord. <
- Color: Will be pearl white and accent covers will be pebble gray.
- Machine Nomenclature: One must be specified.

Brazilian	#2933	Japanese	#2930
Canadian French	#2935	Spanish	#2931
English US	#2924		

- Print Band Character Set: Select one band only by specifying one number from Group A (character set size), one number from Group B (language) and one number from Group C (character set height). When printing 8 lpi, 2.0mm (0.079") character height is recommended. Two print bands (same specify code) will be shipped with the printer. The second band will be a spare for use by the customer as a backup. When the customer installs this backup band, a replacement should be ordered via an MES. The customer will be billed at the current accessory band price. If the customer desires to have Customer Engineering replace or install the print band, or rotate the platen, the CE time involved will be billed to the customer. See "Print Band, Add'l" in Accessories section if more than one band is required.

## Group A

Specify Character Set Size

#2767	48-character set EBCDIC
#2765	48-extended character set (52 graphics)
#2768	64-character set EBCDIC
#9523	63-character set EBCDIC (optimized)
#2770*	96-character set EBCDIC (94 printable)
#2725*	128-character set text

\* Available only with 2.4mm (0.095") character height #9950.

## Group B

Specify	Language
#2950	International
#2955	Japanese English
#2956	English US
#2961	Spanish Speaking
#2973	Japanese Katakana

#2975  
#2977

Brazil  
Canadian French

## Group C

Specify Character Set Height

#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

\* Recommended for printing 8 lines per 25.4mm (inch)

If Spanish N (with Tilde) printing capability is desired on the print band provided with the 3262, order #2961 and one number from Group A (character set size) and one number from Group B (character set height).

## Group A

Specify Character Set Size

#2767	48-Character Set
#2768	64-Character Set
#2770*	96-Character Set
#2779*	116-Character set (Canadian French only)
#2873*	128-Character set (Japanese Katakana only)

\* Available only with 2.4mm (0.095") character height (#9950).

## Group B

Specify Character Set Height

#9950	2.4mm (0.095")
#9951*	2.0mm (0.079")

\* Recommended for printing eight lines per 25.4mm (inch).

## SPECIAL FEATURES

**Audible Alarm Feature (#1090):** Audibly notifies the operator that manual intervention or problem determination is required. The alarm is under printer control and is activated only when the "Check Indicator" is turned on. A switch on the operator's panel can disable the alarm. Maximum: One. Field Installation: Yes.

**OCR Print Feature (#5450):** Provides a manual selection for OCR print applications. OCR feature #5450 is available for the following language codes only and one code must be specified. The specified OCR language code must be the same as specified for the bands ordered with the basic machine.

Language Code	OCR-AON	OCR-BON
#2955	No	Yes
#2956	Yes	Yes
#2961	Yes	No
#2973	No	Yes

One of the following OCR bands (numerics only) must also be specified.

- #0901 OCR-AON 48-Character Set (1)
- #0902 OCR-BON 48-Character Set (1)
- #0903 OCR-BON 128-Katakana Set (1) (2)

## Notes:

- Non-OCR characters are 2.4mm (0.095") in height
- Available only for Japan #2973

Two OCR print bands (OCR numerics and specials only) will be shipped with #5450, in addition to the bands shipped with the basic printer. The second OCR band will be a spare for use by the customer for backup. When the customer installs the backup band, a

replacement should be ordered via an MES. Billing, warranty and ordering additional bands are the same as for non-OCR bands shipped with the printer. Field installation: Yes.

Office (mdls 2 and 12 only)  
Iberian 128 Distributed Office #0893  
(mdls 2 and 12 only)

\* Available only with 2.4mm (0.095") character height.

## MODEL CONVERSIONS (NONE)

## Table B \*\*

## ACCESSORIES

**Print Band, Add'l:** Additional print bands permit the customer to print more than one character set and/or language. Can be used interchangeably with the band provided with the machine. OCR bands are available for printers with OCR feature #5450, and for language codes #2755, #2756, #2757, #2758, #2761, #2762, #2763, #2764, #2773, or #2788. The specified languages for OCR must be the same as specified for the bands ordered with the basic machine. When ordering, order one feature for character set size (Table A), one feature code for language (Table B), and one feature code for character set height (Table C). Order via MES. Only one band per MES. Installation and replacement of these print bands is the customer's responsibility. If the customer desires to have Customer Engineering replace or install the print band, the CE time will be billed to the customer.

Table A

Character Set Size	Feature
48	#5940
48 OCR-AON (numeric & specials)*	#5974
48 OCR-BON (numeric & specials)*	#5975
64	#5944
63 Optimized	#5946
96 (94 printable) *	#5948
128 Text (mdls 3 & 13 only)*	#5961*
116 (Canadian French only)*	#2878
128 (Katakana only) *	#2875
128 OCR-BON Katakana	#0703
North American 128 Distributed	#5962

Language Group	Feature
International	#2750
English US	#2756
Canadian French	#2777
International	#2750
Japanese English	#2755
Canadian/US EBCDIC	#2756
Japanese Katakana *	#2773
Spanish Speaking	#2761
Brazil	
(128-character set not available)	#2775

\* Available only with 128-character set #2875.

\*\* Note: For mdls 2, 3, 12 and 13, only one Language Code (Table B) per printer. Multiple languages on one printer are on an RPQ basis only.

Table C

Character Height	Feature
2.4mm (0.095")	#5950
2.0mm (0.079")	#5951*

\* Recommended for printing 8 lines per 25.4mm (inch).

## SUPPLIES

**Ribbons:** A black ribbon, P/N 7819690 or equivalent, is required. An OCR ribbon, P/N 7032877 or equivalent, is required with OCR feature #5450.

## 3268 PRINTER MODEL 1

### THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

Features, RPQs, and Accessories will continue to be available.

### PURPOSE

Provides hard copy output for the 8100 Information System via Loop attachment, printing at a maximum speed of 340 cps.

### MODEL 1

Model 1 001: (NO LONGER AVAILABLE)

**Prerequisites:** For direct attached loop operation: #4830 or #4835 on the 8101, 8130, or 8140. For data link attached loop operation: 3842 or 3843 Loop Control Unit.

**Customer Setup (CSU):** The 3268 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility.

### HIGHLIGHTS

The 3268 mdl 1 consists of control functions, printer and indicator lights in one integrally designed pedestal unit. 132 printer positions are standard. Horizontal spacing is 10 characters per 25.4 mm (inch) and 16.7 characters per 25.4mm (inch). Selection of horizontal spacing is via a manual switch on the operator panel or via data stream control. Vertical spacing is 3, 4, 6 or 8 lines per 25.4mm (inch). The printer operates in SCS (SNA LU1) mode, which provides for customer program definable horizontal and vertical formatting. APL/Text, Dual Case Operation, Audible Alarm and Cancel Print are provided as standard functions.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 in.) wide. Up to 6-part forms may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration and print quality.

See "Forms Design Reference Guide for Printers", GA24-3488, for forms design considerations.

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities", below.

**Performance Considerations:** Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration, line transmission speed, loop speed, output format, and program application processing must all be considered in determining actual throughput. Refer to "IBM 3268 Printer Component Description", GA27-3267, for more detail.

**Customer Responsibilities:** The Customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 3268.
3. Physical setup, connection of cables, switch settings and checkout.
4. Notifying IBM of intent to relocate and follow IBM instructions for relocation.
5. Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM Service.

6. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
7. Ordering and replacing a worn printhead and insuring that a functional printhead is available for use by a service personnel. The customer must be advised that on his request, can provide on-site installation of the customer-supplied printhead (P/N 7033524) on a per-call billable basis.
8. Procurement, installation, and maintenance of the loop network.

**Communication Cable:** A communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link-attached loop. Standard cable is 4.3m (14 ft) in length.

**Bibliography:** See "KWIC Index", GA20-1621, or specific system bibliography.

### SPECIFY

- Power (AC, 1-phase): Specify one of the following:

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	110V	#2822
200V	#2806	120V	#2800
220V	#2813	127V	#2823
230V	#2821		
240V	#2801		

**Note:** A 2.8m power cord and plug are shipped from the plant of manufacture. The 3-digit country code on the DPMO used to select a power cord with a plug which is most commonly used in that country. If an exception to the above is required, a country RPQ may be initiated. For Canada, the default is a non-locking plug; specify #9890 for a locking plug. For Japan the default is a locking plug; specify #9891 for a non-locking plug.

If a power supply, not the most common, is specified and it is incompatible with the power plug commonly supplied, a power cord without a plug will be supplied unless the country RPQ referenced above is initiated.

- Language: National Use Character Sets are selected via the operator panel. APL/Text may be selected via the SCS data stream.

Character Sets which may be selected include:

Brazilian  
Canadian Bilingual  
English UK  
English US  
French  
German  
German (Alternate)  
International  
Italian  
Japanese English  
Spanish  
Spanish (Alternate)  
Spanish Speaking

For Katakana, specify #0173 for Katakana plus APL/Text or #2773 for National Use Character Set (selected via operator panel) plus Katakana.

- Machine Nomenclature: Available at time of manufacture only.

## MACHINES

Nomenclature default is as follows:

Argentina - Spanish Speaking  
Canada - Canadian Bilingual  
France - French  
Germany - German  
Italy - Italian  
Japan - Japanese  
Mexico - Spanish Speaking  
Peru - Spanish Speaking  
Spain - Spanish Speaking  
Venezuela - Spanish Speaking

All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:

English #2924	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish Speaking #2931

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS

Not recommended for field installation.

## ACCESSORIES

**Forms Stand (#4450):** Available on a purchase-only basis. For shipment with machine, order #4450. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a one-shelf forms stand. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design and stacking considerations.

For field installation: Forms Stand: P/N 8678375 or Feature #4450

## SUPPLIES

**Ribbon (P/N 7032821):** A Black Ribbon Cartridge, P/N 7032821 or equivalent, is required. The ribbon cartridge has a print life\* of five million characters. Replacement printheads and ribbon cartridges are available for purchase from IBM.

\* Ribbon print life is derived from IBM - conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and paper quality.

**Printhead (P/N 7033524):** The life expectancy\*\* of the printhead is 300 million characters.

\*\* Printhead life expectancy is derived from IBM - conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

## 3268 PRINTER MODEL 2

Features, RPQs, and Accessories will continue to be available.

### PURPOSE

Provides hard copy output for the 3270 System via a 3274, 3276 or 8775, a 4331 Processor via Display/Printer Adapter, 4361 Display Printer Adapter or Workstation Adapter, the 3081/3083/ 3084 via the 3082 Processor Controller, the 4341 via a console position, and the 9370 Processor via Workstation Subsystem Controller, printing at a maximum speed of 340 cps.

### MODEL 2

**Model 2 002:** (NO LONGER AVAILABLE)

**Prerequisites:** The device adapters required for attachment are:

- 3274: Available Category A terminal port.
- 3276: Available port or added #3255, #3256, or #3257.
- 4361: Available position on Display Printer Adapter and Workstation Adapter (APL/Text, SCS and Character Print Operation specifies are not supported).
- 4331: Available position on Display/Printer Adapter. (APL/Text, SCS and Character Print Operation specifies are not supported on the 4331.) Specify Character Print Oper. code #9841 must be ordered.
- 4341/4381: Available console position on 4341. (APL/Text, SCS and Character Print Operation specifies are not supported on the 4341.)
- 3081/3083/3084: Attaches via 3082 Processor Controller.
- 3694: Attaches via the 3694 Device Cluster Adapter #3101.
- 8775: Printer Attachment Feature (#5580).
- 9370: Attaches via Workstation Subsystem Controller (#6020).

**Customer Setup (CSU):** The 3268 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

The 3268 mdl 2 consists of control functions, printer and indicator lights in one integrally designed pedestal unit.

The printer operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. 132 print positions are standard. Horizontal spacing is 10 characters per 25.4mm (inch) and 16.7 characters per 25.4mm (inch). Selection of horizontal spacing is via a manual switch on the operator panel or via data stream control. Vertical spacing is 3, 4, 6 and 8 lines per 25.4mm (inch). Vertical spacing may be selected via manual switch on the operator panel or via the program when in SCS mode of operation. APL/Text, Dual Case operation, Audible Alarm and Cancel Print are provided as standard functions.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 in.) wide. Up to 6-part forms with a total thickness of 0.457mm (0.018 in.) may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration, and print quality. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design considerations.

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the cus-

tomers. This has been done by the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities", below.

**Performance Considerations:** Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration, line transmission speed, loop speed, output format, and program application processing must all be considered in determining actual throughput. Refer to "IBM 3268 Printer Component Description", GA27-3267, for more detail.

The FIVE3270 SE Aid is available to estimate printer performance for the particular environment in which the 3268 mdl 2 will be installed. Use of this aid is essential for understanding the effects of transmission speed, data stream protocol, and message sizes on printer throughput.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking, and placement of the 3268.
3. Physical setup, connection of cables, switch settings and checkout.
4. Notifying IBM of intent to relocate and following IBM instructions for relocation.
5. Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM service.
6. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
7. Contact CE to make cable connection of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
8. Ordering and replacing a worn printhead and insuring that a functional printhead is available for use by service personnel. The customer must be advised that on his request, CE can provide on-site installation of the customer-supplied printhead (P/N 7033524) on a per-call billable basis.

**Publications:** See "KWIC Index", GA20-1621, or specific system bibliography.

### SPECIFY

- **Power (AC, 1-phase):** Specify one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800
220V #2813	127V #2823
230V #2821	
240V #2801	

Note: A 2.8 meter power cord and plug are shipped with each machine from the plant of manufacture. The 3-digit country code on the DPMO Sheet is used to select a power cord with a plug which is most commonly used in that country. If an exception to the above is required, a country RPQ may be initiated.

For Canada, the default is a non-locking plug specify #9890 for a locking plug. For Japan, the default is a locking plug; specify #9891 for a non-locking plug.

If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be supplied unless the country RPQ referenced above is initiated.

- Cables: See "Accessories" and "IBM Information Display System Installation Manual - Physical Planning", GA27-2787, for cable details.
- Language: National Use Character Sets are selected via the operator panel. APL/Text may be selected via the SCS data stream.

Character Sets which may be selected include:

Brazilian  
Canadian Bilingual  
English UK  
English US  
French  
German  
German (Alternate)  
International  
Italian  
Japanese English  
Spanish  
Spanish (Alternate)  
Spanish Speaking

For Katakana: #0173 for Katakana plus APL/Text or #2773 for Katakana plus National Use Character Set (selected via operator panel).

- Machine Nomenclature: Available at time of manufacture only. Nomenclature default is as follows:

Argentina - Spanish Speaking  
Canada - Canadian Bilingual  
France - French  
Germany - German  
Italy - Italian  
Japan - Japanese  
Mexico - Spanish Speaking  
Peru - Spanish Speaking  
Spain - Spanish Speaking  
Venezuela - Spanish Speaking

All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:

English	#2924	Italian	#2932
French	#2928	Japanese	#2930
German	#2929	Spanish Speaking	#2931

- Compatibility Options for the 3270 Data Stream (non-SCS) Operation: Operation of the 3268 mdl 2 is defined as standard. Alternate operation may be specified. Note: Standard 3268 mdl 2 operation is the same as the standard 3287 mdls 1 and 2.

Field Installation: Yes. Contact local CE Branch Office for installation.

Carriage Return (CR) at MPP Plus 1

Standard: An automatic New Line (NL) is executed at MP plus 1, then the CR is executed. The next print position will be the first print position of the next line.

#9501: No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

New Line (NL) at MPP Plus 1

Standard: An automatic New (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.

#9502: No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first

print position of the next line. Compatible with 3287 RPQ S30219.

Form Feed Followed by Data

Standard: The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.

#9503: The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220 - SC3752.

Form Feed is Last Character in Print Order

Standard: An automatic new Line (NL) is executed after the form feed is completed. The next print position will be the first print position of the second line on the next form.

#9504: The automatic New Line (NL) is suppressed at completion of the form feed. The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219 - SC3749.

Null Suppression

Standard: If an entire print Line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. Next print position is first print position of current line.

#9505: Prints all null lines as a blank line and performs a new Line (NL). Next print position is first print position of next line. Compatible with 3287 RPQ ML0442 - SC 3741 or 3287 RPQ MK3988 - SC3741.

Form Feed (FF) Command Position

Standard: Execute a Form Feed (FF) command only if it occurs at the first print position in a line or at MPP plus 1. Treat Form Feed (FF) at other positions as spaces.

#9506: Execute a Form Feed (FF) command whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

Automatic Function at End of Print Buffer

Standard: An automatic New Line (NL) is executed following a print order. Next print position is first print position of the next line.

#9507: An automatic Form Feed (FF) is executed following a print order. Next print position is first print position of first line of next form. Compatible with 3287 RPQ MK3988 - SC3740.

- Character Print Operation: The basic machine provides for operation with a program which requires a print buffer of 1,920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below.

Field Installation: Yes. Contact local CE Branch Office for installation.

#9521 (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

#9523 (2,560-character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command.

#9524 (3,440-character print operation) for use with a program which requires a print buffer size of 3,440 bytes while using Erase/Write Alternate Command.

#9525 (3,564-character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate Command. Limitation: This specify code is not valid when the 3268 is attached to a 3274 with Configuration Support A (#9110).

- #9181 - Provides the following:

## MACHINES

Up to 220 characters per line at 16.7 characters per inch.

Set print density control code support via data stream.

Save/restore formats structured field - provides for saving the current printer format parameters and restoring the previously saved parameters.

Query list structured field - provides capability for the application to selectively query the printer.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS

Not recommended for field installation.

## ACCESSORIES

**Forms Stand (#4450):** Available on a purchase-only basis. For shipment with machine, order #4450. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a 1-shelf forms stand. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design and stacking considerations.

For field installation: Forms Stand: P/N 8678375 or Feature #4450

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation in your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

- Assm 2577672 Cable Assembly In-Door
- Bulk 0323921 Coax Wire (Note 1)
- P/N 1836418 Connector Kit (Note 1)
- Assm 1833108 Cable Assembly Out-Door

- Bulk 5252750 Coax Wire (Note 2)
- P/N 1836419 Connector Kit (Note 2)
- P/N 1833104 Station Protector Kit, Carbon (Note 4)
- P/N 2621414 Mod. Kit (Note 3)
- P/N 1833106 Station Protector Attachment Kit (Note 5)
- P/N 5252772 Station Prot. Element Carbon (Note 6)
- P/N 5252643 Adapter (Note 7)
- P/N 1830818 Station Protection Kit, Gas (Note 4)
- P/N 5252899 Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

## Notes:

1. Coax wire and one connector kit (includes two connectors P/N 1836446) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N 2577672 or two P/N 1833108 cable assemblies together.

## SUPPLIES

**Ribbon (P/N 7032821):** A Black Ribbon Cartridge, P/N 7032821 or equivalent, is required. The ribbon cartridge has a print life\* of five million characters. Replacement printheads and ribbon cartridges are available for purchase from IBM.

\* Ribbon print life derived from IBM - conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings and paper quality.

**Printhead (P/N 7033524):** The life expectancy\*\* of the printhead is 300 million characters.

\*\* Printhead life expectancy is derived from IBM - conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

## 3268 COLOR PRINTER MODEL 2C

Features, RPQs, and Accessories will continue to be available.

### PURPOSE

Provides hard copy output in black and color by using replaceable ribbon cartridges at a maximum speed of 340 cps. Attaches to a 3270 Information Display System via a 3274 or a 3276, a or 4331 via a port on the Display/Printer Adapter, Display Printer Adapter or Workstation Adapter and a 4341 via a console position, and 9370 via Workstation Subsystem Controller.

### MODEL 2C

**Model 2C C02: (NO LONGER AVAILABLE)**

#### Prerequisites:

- Attachment Required on Control Unit.
- 3274 Available Category A terminal port.
- 3276 (1) Available port or added #3255, #3256 or #3257.
- 4331 (2) Available port on Standard Display/Printer Adapter.
- 4341 (2) Available console position on 4341.
- 4361 (2) Available port on the Display Printer Adapter or Workstation Adapter.
- 9370 Workstation Subsystem Controller (#6020)

#### Notes:

1. Programmed Symbols (PS) is not supported on 3276.
2. PS, APL/Text, SCS and Character Print Operation specifications are not supported on 4331 or 4341.

**Customer Setup (CSU):** The 3268-2C is designed as Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

The unit consists of control functions, printer and indicator lights in one integrally designed pedestal unit. The printer operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. 132 print positions at 10 characters per 25.4mm (inch) and 220 print positions at 16.7 characters per 25.4mm (inch) are standard. Selection of horizontal spacing (10 cpi or 16.7 cpi) is via a manual switch on the operator panel or via the program when in SCS mode of operation. Vertical spacing is 3, 4, 6 and 8 lines per 25.4mm (inch). Vertical spacing may be selected via manual switches on the operator panel or via the program when in SCS mode of operation. APL/Text, Dual Case operation, Audible Alarm, Cancel Print, Extended Character Set Adapter and PS are provided as standard functions.

PS may be configured either as six single-plane 190-symbol sets whose shapes and codes are customer definable and which allow printing within a character location a single selected color (green, blue, red or black) or as three single-plane 190-symbol sets and one triple-plane 190-symbol set. The triple-plane symbol set allows printing of up to four colors within a single character position. Selection of the PS configuration is via the operator panel. Prerequisite for use of PS is attachment to a 3274 with Configuration Support C or D. Prerequisite for use of PS on 4361 is the Workstation Adapter.

Continuous forms are fed by a forms tractor which accepts forms up to 406.4mm (16 in.) wide. Up to 6-part forms with a total thickness of 0.457mm (0.018 in.) may be used. 5- and 6-part forms should be tested on an individual basis for acceptable feeding, registration,

and print quality. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design considerations.

Using the replaceable multi-color ribbon cartridge, two modes of color selection (base color and extended color) may be employed. Base Color Printing is the selection of color at the field level as a function of the 3270 Data Stream protect and intensify attribute byte. The display to printer mapping is as follows:

3270 Attribute Byte	Color Displayed	Color Printed
Not Protected, Normal Intensity	Green	Black Green
Protected, Intensified	White	Green Black
Not Protected, Intensified	Red	Red Red
Protected, Normal Intensity	Blue	Blue Blue

Extended color printing is the selection of color at the character level in addition to the field level. The display to printer color mapping for extended color is:

Color Displayed	Color Printed
White	Black
Red	Red
Blue	Blue
Green	Green
Turquoise	Black (by default)
Pink	Black (by default)
Yellow	Black (by default)

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines, and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

**Performance Considerations:** Actual printer throughput is dependent upon operational and system characteristics. Factors such as control unit configuration, line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

Compared to black or monochrome printing, throughput will be reduced when printing in multi-color as a function of the number of color changes on the page due to a separate pass of the printhead for each color on a line. In addition, when printing in other than the standard character format (4 of 7 horizontal X 8 vertical dots) and using PS, the printer will print at reduced speeds. Under these conditions the printer prints unidirectionally at 147 cps. Dense printing when using PS will also lessen printer throughput. Refer to the "IBM 3268 Printer Component Description", GA27-3268, for more details.

The FIVE3270 SE Aid is available to estimate printer performance for the particular environment in which the 3268 will be installed. Use of this aid is essential for understanding the effects of transmission speed, data stream protocol, and message sizes on printer throughput.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking, and placement of the 3268.
3. Physical setup, connection of cables, switch settings and checkout.
4. Notifying IBM of intent to relocate and following IBM instructions for relocation.

5. Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM service.
6. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
7. Contact CE to make cable connection of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
8. Ordering and replacing a worn printhead and ensuring that a functional printhead is available for use by service personnel. The customer must be advised that on his request, CE can provide on-site installation of the customer-supplied printhead (P/N 7033701) on a per-call billable basis.

**Publications:** See "KWIC Index", G320-1621, or specific system bibliography.

### SPECIFY

- Power (AC, 1-phase): Specify one of the following:

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	110V	#2822
200V	#2806	120V	#2800
220V	#2813	127V	#2823
230V	#2821		
240V	#2801		

Note: A 2.8m power cord and plug are shipped with each machine from the plant of manufacture. The 3-digit WT country code on the DPMO Sheet is used to select a power cord with a plug which is most commonly used in that WT country. If an exception to the above is required, a country RPQ may be initiated.

For Canada, the default is a non-locking plug; specify #9890 for a locking plug. For Japan, the default is a locking plug; specify #9891 for a non-locking plug. If a power supply, not the most common, is specified and it is incompatible with the power plug commonly supplied, a power cord without a plug will be supplied unless the country RPQ referenced above is initiated.

- Cables: See "Accessories" and "IBM Information Display System Installation Manual - Physical Planning", GA27-2787, for cable details.
- Language: National Use Character Sets are selected via the operator panel.

Character Sets which may be selected include:

Brazilian  
Canadian Bilingual  
English UK  
English US  
French  
German  
German (Alternate)  
International  
Italian  
Japanese English  
Spanish  
Spanish (Alternate)  
Spanish Speaking

For Katakana: #0173 for Katakana plus APL/Text or #2773 for Katakana plus National Use Character Set (selected via operator panel).

- Machine Nomenclature: Available at time of manufacture only. Nomenclature defaults are as follows:  
Argentina - Spanish Speaking

Canada - Canadian Bilingual  
France - French  
Germany - German  
Italy - Italian  
Japan - Japanese  
Mexico - Spanish Speaking  
Peru - Spanish Speaking  
Spain - Spanish Speaking  
Venezuela - Spanish Speaking

All other countries default to English. Alternate nomenclature may be chosen by specifying one of the following:

English #2924 Italian #2932  
French #2928 Japanese #2930  
German #2929 Spanish Speaking #2931

- Compatibility Options for the 3270 Data Stream (Non-SCS) Operation: Standard operations of the 3268 mdl 2C are described in the paragraph marked "standard". Alternate operation may be specified. Note: Standard 3268 mdl 2C operation is the same as the standard 3287 mdls 1 and 2 and 3268-2. Field Installation: Yes. Contact local CE Branch Office for installation.

Carriage Return (CR) at MPP Plus 1

Standard: An automatic New Line (NL) is executed at MP plus 1, then the CR is executed. The next print position will be the first print position of the next line.

#9501: No automatic New Line (NL) is executed. The CR is executed at MPP plus 1. The next print position will be the first print position of the current line. Compatible with 3287 RPQ S30219.

New Line (NL) at MPP Plus 1

Standard: An automatic New Line (NL) is executed at MPP plus 1, then the NL is executed. The next print position will be the first print position of the current line plus 2.

#9502: No automatic New Line (NL) is executed. The NL is executed at MPP plus 1. The next print position will be the first print position of the next line. Compatible with 3287 RPQ S30219.

Form Feed (FF) Followed by Data

Standard: The form will be skipped to the first line of the next form and the next print position will be the second print position of that line.

#9503: The form will be skipped to the first line of the next form and the next print position will be the first print position of that line. Compatible with 3289 RPQ S30220 - SC3752.

Form Feed (FF) is Last Character in Print Order

Standard: An automatic New Line (NL) is executed after the Form Feed (FF) is completed. The next print position will be the first print position of the second line on the next form.

#9504: The automatic New Line (NL) is suppressed at completion of the Form Feed (FF). The next print position will be the first print position of the first line of the next form. Compatible with 3287 RPQ S30219 - SC3749.

Null Suppression

Standard: If an entire print line contains no printable characters, no New Line (NL) is performed. Space (X'40') is considered a printable character. Next print position is first print position of current line.

#9505: Prints all null lines as a blank line and performs a New Line (NL). Next print position is first print position of next line. Compatible with 3287 RPQ ML0442 - SC 3741 or 3287 RPQ MK3988 - SC3741.

## Form Feed (FF) Command Position

Standard: Execute a Form Feed (FF) command only if it occurs at the first print position in a line or at MPP plus 1. Treat Form Feed (FF) at other positions as spaces.

#9506: Execute a Form Feed (FF) command whenever it is encountered in the Data Stream. Compatible with 3287 RPQ ML0442 - SC3739 or 3287 RPQ MK3988 - SC3739.

## Automatic Function at End of Print Buffer

Standard: An automatic New Line (NL) is executed following a print order. Next print position is first print position of the next line.

#9507: An automatic Form Feed (FF) is executed following a print order. Next print position is first print position of first line of next form. Compatible with 3287 RPQ MK3988 - SC3740.

## Full Page on Skip Suppress

Standard: Execute an automatic form feed when the number of lines set in the maximum page length counter has been printed when operating in skip suppress mode.

RPQ S30277: Print a full page prior to automatic form feed when operating in skip suppress mode. Compatible with 3287 RPQ S30273. Full page is defined by the values of maximum page length times lines per inch (MPL)x(LPI). Note: Machines will be shipped from plant with RPQ S30277 installed.

Field Installation: Yes. Contact local CE Branch Office for installation.

## Form Feed after Local Copy

Standard: An automatic New Line (NL) is executed following a print order resulting from an operator-initiated local copy if specify feature #9507 is not selected.

#9508: An automatic Form Feed (FF) is executed following a print order resulting from an operator-initiated local copy. The operator uses the print key on the display keyboard to initiate a local copy. A host-initiated local or a host direct print does not cause this form feed.

- Character Print Operation: The basic machine provides for operation with a program which requires a print buffer of 1,920 bytes while using Erase/Write Alternate Command. For other buffer size requirements, specify as listed below. Field Installation: Yes. Contact local CE Branch Office for installation.

#9521 (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.

#9523 (2,560-character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command.

#9524 (3,440-character print operation) for use with a program which requires a printer buffer size of 3,440 bytes while using Erase/Write Alternate Command.

#9525 (3,564-character print operation) for use with a program which requires a printer buffer size of 3,564 bytes while using Erase/Write Alternate Command.

- Base Color Print Operation: The basic machine is shipped with base color black. For base color green order (#9136). Base color is defined under "Highlights" above.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS

Not recommended for field installation.

## ACCESSORIES

**Forms Stand (#4450):** Available on a purchase-only basis. For shipment with machine, order #4450. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. This accessory is a 1-shelf forms stand. See "Forms Design Reference Guide for Printers", GA24-3488, for forms design and stacking considerations. For field installation: Forms Stand: P/N 8678375 or Feature #4450.

**Cables:** Cables and or associated parts to attach the 3268-2C to the 3271s/3272s/3274s and the 3276, or Local Display Adapter (#4702) on the 3276, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and Coaxial Cable and Accessories Manual, GA27-2805. The customer is responsible for installation and maintenance of these cables and their associated parts.

- Assm 2577672 Cable Assembly In-Door
- Bulk 0323921 Coax Wire (Note 1)
- P/N 1836418 Connector Kit (Note 1)
- Assm 1833108 Cable Assembly Out-Door
- Bulk 5252750 Coax Wire (Note 2)
- P/N 1836419 Connector Kit (Note 2)
- P/N 1833104 Station Protector Kit, Carbon (Note 4)
- P/N 2621414 Modification Kit (Note 3)
- P/N 1833106 Station Protector Attachment Kit (Note 5)
- P/N 5252772 Station Protector Element Carbon (Note 6) P/N 5252643 Adapter (Note 7) P/N 1830818 Station Protection Kit, Gas (Note 4) P/N 5252899 Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

## Notes:

1. Coax wire and one connector kit (includes two connectors P/N 1836446) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N 2577672 or two P/N 1833108 cable assemblies together.

## SUPPLIES

**Ribbon (P/N 7037980):** A multi-colored ribbon cartridge, P/N 7037980 or equivalent, is required for color printing. A black ribbon cartridge P/N 7037979 or equivalent may be used for printing only black.

The multi-colored ribbon cartridge has a print life\* of one million characters for red, green and blue tracks, and two million characters for the black track. The all-black ribbon cartridge has a print life\* of eight million characters. Replacement printheads and ribbon cartridges are available for purchase from IBM.

\* Ribbon print life is derived from IBM-conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings and paper quality.

**Printhead (P/N 7033701):** The life expectancy\*\* of the printhead is 175 million characters.

\*\* Printhead life expectancy is derived from IBM-conducted tests. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

## 3274 CONTROL UNIT MODEL 1

(NO LONGER AVAILABLE)

**THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT**

### PURPOSE

Provides the capability of controlling up to a maximum cluster of 32 terminals consisting of display stations, and/or printers. Two categories of terminal adapters are used in attaching the desired displays or printers (see "Terminal Attachment List" below). The basic 3274 allows attachment of up to eight Category A terminals. The two categories of terminal adapters can be featured in various combinations to provide the maximum terminal configuration of 32 terminals (a maximum of 16 of the 32 terminals can be Category B units and at least one Category A Display Station with keyboard is needed for diagnostic purposes). The 3274 has one model for communicating in data half-duplex mode via half-duplex or duplex communications facilities and three models for local channel attachment.

### ATTACHABLE TERMINALS

#### Category A Terminals:

- 3178 mdl C1, C2: Display Station
- 3178 mdl C3, C4: Display Station (See Note 5)
- 3191 (See M3191 pages for models): Display Station
- 3192 (See M3192 pages for models): Display Station
- 3262 mdl 3 & 13: Line Printer
- 3268 mdl 2: Impact Matrix Printer
- 3268 mdl 2C: Color Impact Matrix Printer
- 3270 Personal Computer (Control Unit Terminal Mode)
- 3278 mdl 1, 2, 3, 4, 5: Display Station (see Note 1)
- 3279 mdl 2A, 2B, 3A, 3B, 02X, 03X: Color Display Station
- 3287 mdl 1, 2: Impact Matrix Printer
- 3287 mdl 1C, 2C w/#8331: Color Impact Matrix Printer
- 3289 mdl 1, 2: Line Printer
- 3290 mdl 1: Information Panel
- 4245 mdls D12, D20 (supported as a 3262 mdl 3): Line Printer
- 4250: APA Printer (see Notes 2 and 3)
- 5150: Personal Computer (via 3278/79 Emulation Adapter)
- 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only): Personal Computer XT/370
- 5160 mdl 589 (Control Unit Terminal Mode only): Personal Computer XT/370
- 5170 mdl 599 and mdl 739 (Control Unit Terminal Mode only): Personal Computer AT/370
- 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only): Personal Computer AT/370
- 5210 mdl G1, G2: Printwheel Printer
- 6580 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and LP 5608-SR9 (see Note 4): Displaywriter System

#### Notes:

1. Mdl 5 cannot be attached to a 3274 mdl 1B.
2. 4250 cannot attach to 3274 mdls 1B and 1C.
3. Because of the high data volumes possible with this printer, it is strongly recommended the IBM Aid FIVE3270 be used to predict the effect the 4250 has on subsystem performance.
4. Two terminal ports are required to attach a Displaywriter System when it includes a printer.
5. Mdl C3, C4 support requires RPQs. See "Prerequisites" section in M3178 pages for details.

#### Category B Terminals:

- 3277 mdl 1, 2: Display Station
- 3284 mdl 1, 2: Impact Matrix Printer
- 3286 mdl 1, 2: Impact Matrix Printer

- 3287 mdl 1, 2 (with 3271/3272 attachment feature): Impact Matrix Printer
- 3288 mdl 2: Line Printer

### MODELS 1A, B1, 1C, 1D

**Model 1A A01:** For local (SNA version) attachment, via a byte multiplexer, selector, or \*block multiplexer channel, to a S/370 or 30XX processor; or any 4300 processor via a byte multiplexer or block multiplexer channel.

**Model B1 B01:** For local (3272 version) attachment, via a byte multiplexer, selector, or \*block multiplexer channel, to a S/370 or 30XX processor, or S/360 mdls 30, 40, 50, 65, 75, and 195; or any 4300 processor via a byte multiplexer or block multiplexer channel.

\* Attachment to a non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

**Model 1C C01:** For communicating in data half-duplex mode over half-duplex or duplex communications facilities with the following:

- A S/370, 30XX or 4300 processor via 3704 or 3705 (or via the Communications Adapter feature on the 4331), using Synchronous Data Link Control (SDLC/SNA).
- A S/370, 30XX or 4300 processor via (where applicable) 2701, 2703, a 3704 or 3705, or a Communications Adapter feature on the 4331, using Binary Synchronous Communications (BSC).
- S/370 mdls 115, 125, 135 and 138 via Integrated Communications Adapter (ICA) using BSC.
- S/360 mdls 30, 40, 50, 65, 75, and 195 via 2701, 2703, or a 3704 or 3705 using BSC.

**Model 1D D01:** For Local (3272 version) attachment, via a byte multiplexer, selector or \*block multiplexer channel, to a virtual storage S/370 processor, or any 4300 processor via a byte multiplexer or block multiplexer channel.

\* Attachment to non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

#### Prerequisites:

1. One 3178, 3278, or 3279 with keyboard is needed on each 3274 as a diagnostic aid. It must be attached to the first terminal address on the control unit (Port 0).
2. A 3274 mdl 1C requires a Communications Adapter and a Communication Interface for host communications. An external modem is required with the External Modem Interface (#3701) and the CCITT V.35 Interface (#1550) unless the 3274 mdl 1C is to be directly attached to its host. The Data Circuit-Terminating Equipment or direct attachment host to which the 3274 mdl 1C is attached must provide clocking.

**Customer Setup (CSU):** The 3274 mdl 1C is designated as Customer Setup, thereby offering the customer early availability and terminal relocation flexibility. The customer is responsible for attaching CSU units to the 3274. For additional information on CSU, refer to GI section.

### HIGHLIGHTS

The 3274 is a terminal control unit which can attach up to 32 displays, and/or printers, unless a Displaywriter System(s), which includes a printer, is to be attached. A Displaywriter System without

a printer requires one terminal port (the same as other terminals), but when a Displaywriter System includes a printer, two terminal ports are required to attach. These terminals are grouped into two categories, A and B. The Category A terminals are a display and printers which were developed for attachment to the 3274, while the Category B terminals were designed for attachment to the 3271s and 3272s. The 3274 attaches the Category B terminals with certain limitations. A maximum of 16 of the 32 attachable terminals can be Category B terminals. During a write operation, a 3277 attached to a 3274 via a Type B Terminal Adapter will blink more frequently than when attached to a 3271 or 3272. Category A terminals can be driven up to a maximum of 610m (2,000 ft) using shielded twisted pair cable or 1,500m (4,920 ft) using coaxial cable. (3289 attaches with coaxial cable only.) Category B terminals can be driven a maximum of 610m (2,000 ft) using coaxial cable or 152m (500 ft) using shielded twisted-pair cable.

The 3274 can communicate with a S/360, S/370, 30XX, 4300 or 9370 Processor by local channel attach or remotely via communications facilities. The channel-attached Control Unit is available in three models; mdl 1A for SNA operation with extended data stream handling capabilities, mdl 1B for 3272 operation, and mdl 1D for 3272 operation with extended data stream handling capabilities. The mdl 1C can operate with extended data stream handling capabilities as either a BSC 3271 or as an SNA/SDLC unit.

The flexibility of 3274s enables the user to configure a display sub-system for initial requirements, and later change hardware and functions to meet future needs. Function configurability is attained through a Configuration Support option via feature and system diskettes.

One Feature Diskette, two Systems Diskettes, and (except Canada) a Language Diskette are shipped with each 3274. An Encrypt/Decrypt Feature Diskette is also shipped with the Encrypt/Decrypt feature (#3680) on a 3274 mdl 1C. As part of the installation procedure, a customized System diskette is generated. The generation process is accomplished by the customer keying in system configuration parameters. A unique configuration table is written on the System Diskette along with the necessary control code to accomplish the functions. For example, during subsequent control unit loading or initialization of a mdl 1C, BSC or SNA/SDLC mode of operation is determined by the configuration recorded on the System Diskette used. It is possible to create two different System Diskettes; one to be used for BSC (3271 compatible) operation and the other to be used when operating SNA/SDLC.

The control unit is initialized with control code and configuration parameters as a result of Power On or by pressing the IML push-button. The load occurs from an integrated diskette drive using the previously customized System Diskette. The loading process starts with the execution of extended tests contained on the diskette.

The character set to be used on attached terminals is specified on the customized IML Diskette during installation procedure. All attached terminals must have the same character set.

Detailed information for initial customizing, for customizing made necessary by changing configurations, and for optionally updating the diskettes, is contained in the "IBM 3270 Information Display System, IBM 3274 Control Unit Planning, Setup and Customizing Guide", GA27-2827.

**Katakana Support:** The 127-character (plus space and null) support is an enhancement of previously announced 3270 Japanese Katakana. Katakana terminals will not be 3270 compatible for customers using the NL and EM codes. Customers who do not use the NL and EM codes will be 3274 and 3276 compatible. For detail, see appropriate SRLs.

The HONE configurator is available to assist in configuring the 3274.

## COMMUNICATIONS

The 3274 mdl 1C communicates in half duplex mode with a S/370, 30XX, 4300 or 9370 Processor using SDLC over duplex or half-duplex communications facilities to a 3704/3705 (or via Communications Adapter feature (#1601) on the 4331); or by BSC to a S/360, S/370,

30XX, 4300 or 9370 Processor, over duplex or half-duplex communications facilities via (where applicable) a 2701, 2703, or a 3704/3705.

Communications with a S/370 mdl 115, 125, 135, or 138 can also be via the Integrated Communications Adapter (4640) and appropriate BSC features on a 3115, 3125, 3135, or 3138. Communications with a 4331 Processor can be via the Communications Adapter (#1601) using BSC or SDLC/SNA protocols.

SDLC as used in the 3274-1C conforms to a subset (unbalanced normal mode) of both the ISO HDLC and ANSI ADCCP standards. For details of this conformance, see "General Information Manual, IBM Synchronous Data Link Control", GA27-3093.

A 3274 mdl 1C can be used with X.25 communications facilities by using Configuration Support P #9116 and having appropriate hardware features to support this Configuration Support Option. See "X.25 Support" under "Control Storage Functions" and the Configuration Support P description for details.

**Performance:** For many 3274 mdl 1C, 21C, 31C and 51C systems, response time is limited by transmission line speeds. For these cases, applicable line speed upgrades can be translated into immediate response time improvements. However, performance is also data stream-dependent. Refer to IBM Aids for performance evaluation information.

**Communications Facilities:** The 3274 mdl 1C operates in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of (Canada only > 2000, < 2400, 4800, 7200 and 9600 bps on nonswitched facilities. See M2700 pages for facilities.

Multipoint and point-to-point communications at speeds up to 56K bps are also possible where facilities are available. In addition, communications through a 3705, or to the 4331 Communications Adapter can be via direct connection (without modems or communications facilities) at speeds up to 57.6K bps. All communications at speeds greater than 9600 bps must use SDLC. See M3705 and 4331 pages for details.

**Communications Adapters:** Communications adapters handle the transmission control protocols (SDLC and BSC) for the 3274 mdl 1C.

**Communications Interfaces:** Communications interfaces connect the 3274 mdl 1C to the host link. One and only one, can be selected.

## MODEMS

Unless the 3274 mdl 1C will be directly attached to its host, an external modem with its own clocking is required when the External Modem Interface (#3701) or CCITT V.35 Interface (#1550) feature is installed.

Modem	Speed (bps)	Line
3863 mdl 1	2400/1200	Nonswitched Voice Grade
3864 mdl 1	4800/1200	Nonswitched Voice Grade
3865 mdl 1/2	9600/4800	CCITT M1020 channel
3868 mdl 1	2400/1200	Nonswitched Voice Grade
3868 mdl 2	4800/2400	Nonswitched Voice Grade
3868 mdl 3/4	9600/4800	CCITT M1020 Channel
3872 mdl 1	2400/1200	Nonswitched Voice Grade
5811 mdl 10	2400/4800/9600	Limited Distance Modem
mdl 18	Rack Mount Version of	

5865 mdl 1	Mdl 10 9600/7200/ 4800	Nonswitched
5866 mdl 1	14.4K/12K	Nonswitched
(5865 Mode)	9600	Nonswitched
5868 mdl 10	Rack Mount Version of 5865	
mdl 18	Rack Mount Version of 5866	
5979 mdl L41	9600	Limited Distance COAM

4-wire Switched Network Back-up is available on 3863, 3864, and 3865 modems with Auto Answer.

Switched network backup operation with Manual Call and Manual or Auto Answer is available on the 3863 mdl 1, 3864 mdl 1, 3865 mdl 1, 3865 mdl 2 and 3872 mdl 1. For communications capabilities, product utilization and features, see M2700, 3863, 3864, 3865 and 3872 pages.

## DIRECT CONNECTION ATTACHMENT

In addition to host attachment via modems or other data circuit-terminating equipment (DCE), attachment can be made by direct connect, without the need for intervening DCE. The direct connect is made by using either the External Modem Interface (#3701) or the V.35 Interface (#1550), the corresponding host interface feature(s), and a connecting cable. Shown below are the hosts that provide direct connection attachment for the 3274. Only the basic features needed by the 3274 direct connect hosts are listed. These features may have prerequisites, therefore the machine pages for those hosts should also be reviewed. Physical planning manuals for the respective direct connect hosts can provide additional information on the connecting cables.

Attach Host	Speed (bps)	Host Feature #	B	D	S	L	C
3705	14.4K, 57.6K	#4727 (1W)	-	x			
3705	14.4K, 57.6K	#4728 (1Z)	-	x			
4331	2400	#4801	x	x			
4331	4800	#4801	x	x			
4331	9600	#4801	x	x			

Attach Host	Max Cable Length	3274 Feature #
3705	57m (190')	#1550, #6303
3705	57m (190')	#1550, #6303
4331	400m (1,312')	#3701, #6302
4331	200m (656')	#3701, #6302
4331	100m (328')	#3701, #6302 or #6303

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

The Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing communication network problem determination/isolation and enhances the availability and serviceability of the 3274 for the above environments in all host attachment modes. See NPDA in the Program Products section.

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation enhances the availability and serviceability of the 3274 in BSC mode or channel attachment. See DEMF in the SCP sections for OS/VS1 and OS/VS2.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
3. Contact CE to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
4. Notify IBM of intent to relocate and follow IBM instructions for relocation.
5. Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
6. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
7. Receipt at the customer's receiving dock, unpacking, and placement of the 3274.
8. Contacting IBM CE to accomplish the channel connection tasks for the 3274 mdls 1A, 1B, or 1D.
9. Connection of communication cable to the communications facility for the 3274 mdl 1C.
10. Performing 3274 customization in accordance with IBM-supplied procedures:
  - a. For initial installation.
  - b. When made necessary by changes in configuration.
  - c. For updating of the control unit diskettes (at customer option).

**Publications:** See "KWIC Index", G320-1621, or applicable system bibliography:

GC20-0360S/360  
GC20-0001S/370  
GC20-00014300  
GC20-81008100

**Note:** Use the HONE Configurator AID (CF3270) to assist in configuring the 3274 before entering an order on AAS.

## SPECIFY

- Power (AC, 1-phase): Specify #2998 for an AG-A/PG country except Canada and then select one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800*
220V #2813	127V #2823
230V #2821	200V #2732
240V #2801	208V #9902
220V #2803	
240V #2831**	

\* Includes requirements for 115V

\*\* Includes requirements for 230V

- Plugs:

For Canada only, specify #9890 for locking plug or #9891 for non-locking plug (both at 60 Hz, 120V, 1-phase).

For Japan only, specify #9890 for locking plug or #9891 for non-locking plug for voltages under 200V.

For countries except Canada and Japan, the 3-digit country code of the DPMO is used to select a power plug which matches the most commonly-used power supply in that country. If an exception to the above is required, a country RPQ may be initiated. For details concerning power plugs, refer to "IBM Information Display System Installation Manual - Physical Planning", (GA27-2787).

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

- Character Set Language (Canada): #2756 for English US.
- Keyboard Language (Canada): #2956 for English US.
- Machine Nomenclature:

Brazilian #2933	English US #2924
Canadian	Japanese #2930
French #2935	Spanish Speaking
English UK #2927	#2931

- Communication Cable: (mdl 1C only) If the standard 6.1m (20 ft) communication cable is not desired, specify one of the following: #9061 for 3.0m (10 ft), #9062 for 9.1m (30 ft) or #9063 for 12.2m (40 ft).
- Configuration Support: The Configuration support required for the 3274 must be determined before ordering special features or attaching certain terminals. Refer to the 3274 Control Storage Requirements Tables under "Special Feature" Extended Function Store (EFS) for a detailed listing of the functions supports by each option. Field Installation: Yes. Customer Setup: Yes. Limitations: Certain functions require host software support in order to be utilized. Refer to host programming support descriptions to determine the levels of software required.
- Note:** When operating a large screen (screen size greater than 1,920 characters) display station that is connected to a 3274 mdl 1B, 1C, or 1D in a VM/370 environment, an RPQ is recommended to change the function of the display keyboard Clear key so that it will not place the display in default mode. See RPQ 8K0976, 8K0977, or 8K0978.
- Configuration Support A (#9110): This Configuration Support is shipped with all 3274s unless Configuration Support B #9111 or C #9112 or P #9116 is specified. It provides support for all 3270 functions listed in Table 1 (see EFS under "Special Features"), plus support for solicitation of summary maintenance statistics from a 3274 mdl 1A or a 3274 mdl 1C with SNA/SDLC IML, through the use of Network Problem Determination Application (NPDA), and support for base color on attached terminals and 3270 Personal Computer (Control Unit Terminal Mode).
- Configuration Support B (#9111): (Mdl 1A, 1C, 1D) Provides support for all 3270 functions included in Configuration Support A #9110 plus the ability to attach 3278 mdl 5 displays, and support for the following functions:
  - Pacing of inbound message traffic (mdls 1A and 1C/SNA).
  - Automatic Session recovery in both single and multi-domain networks (mdl 1C/SNA).
  - Host notification of changes in the power on/off status at attached terminals (mdls 1A and 1C/SNA).
- Configuration Support C (#9112): (Mdl 1A, 1C, 1D) Provides support for all 3270 functions included in Configuration Support B, plus support for the following additional functions:
  - Structured Field and Attribute Processing.
  - Programmed Symbols (PS) on attached Terminals.
  - Extended Color on attached terminals.
  - Extended Highlighting on attached terminals.

- Decompression of PS Load data.
- BSC Text Blocking.
- BSC Transparency.
- Entry Assist RPQ.
- 4250 attachment (mdls 1A and 1D only).
- Alert Function (mdls 1A and 1C/SNA).

Notes:

1. The APL/Text Control Function, which is a separate option in Configuration Support A and B, is included as a basic function of Configuration Support C.
2. Configuration Support C, unlike Configuration Support A or B, generates a program check (X PROG 470) whenever an EBCDIC data stream contains a device control code(s) that the 3274 does not support. To prevent the program check, users must purge the unsupported code(s) from the data stream.

Configuration Support C requires #3623 or #3625 as a prerequisite.

- Configuration Support P (#9116): (Mdl 1C) Provides functions equivalent to Configuration Support A, but is for X.25 operation only. The necessary keyboard labels required for X.25 support on the attached 3178, 3278 or 3279 terminals are shipped with each Configuration Support P #9116.

Prerequisites: (1) 128K of control storage - #1801, #3622, #3625, and #3628, or #1801, #3623, and #3628. (2) #6303.

- Configuration Support T: (Mdl 1A, 1C, 1D) This Configuration support is Specify Code #9113 (NO LONGER AVAILABLE) or #9115 (NO LONGER AVAILABLE, Japan only) and provides support for the 3290 or 3270 Personal Computer (Distributed Function Mode) in addition to the other 3270 functions and terminals except:

Category B Terminals

- 3279 "Extended Color" Mdl
- Structured Field and Attribute Processing
- Programmed Symbols
- Loop Adapter
- X.21 Adapter
- Encrypt/Decrypt
- Entry Assist
- 4250 Printer Attachment
- Alert Function
- Response Time Monitor
- X.25

Two 3290 microcode load diskettes are automatically included with Configuration Support T (only one System Diskette is included with Configuration Support T). A Utility Diskette is provided to customize keyboard and keypad layouts. This Configuration Support option was developed for the user who desires to evaluate the operation of the 3290 or 3270 Personal Computer (Distributed Function Mode) on existing 3274s. Based on the intended use and inherent limitations, IBM has no intent to enhance Configuration Support T.

Prerequisites: 128K of control storage - #1801, #3622, #3625, and #3628 or #1801, #3623, and #3628. Limitations: (1) Because Configuration Support T was developed as the configuration support for evaluating of 3290s or 3270 Personal Computer (Distributed Function Mode) it does not restrict having one of the other Configuration Support A, B, or C, options although they cannot be used concurrently. (2) Hebrew Language (RPQ 7H0524) is NOT supported by Configuration Support T. Specify: For Configuration Support T, specify #9113 (NO LONGER AVAILABLE) for all languages except Katakana. For Katakana specify #9115 (NO LONGER AVAILABLE, Japan only).

Customers who have ordered, or plan to order for purchase, 3274 mdls 1A/B/C/D and anticipate later upgrading to mdls 31A/C/D should consider purchase of mdls 21A/B/C/D initially, because field upgrade of the mdl 1A/B/C/D requires replacement of the base storage at an additional cost.

## SPECIAL FEATURES

**Note:** After the configuration support and the desired special features have been selected, the control storage requirement must be determined by using the tables under Extended Function Store (EFS) features below. Some combinations of functions and features may exceed the capacity of the control storage in the basic machine, in which case Table 2 will identify what EFS features must be ordered. Still other combinations may exceed the maximum control storage possible with all EFS features. Such combinations are invalid configurations and cannot be configured. In these situations, feature(s) must be forfeited in order to reduce the control storage requirement to an amount not exceeding the maximum control storage possible.

**Control Storage Expansion (#1801):** Provides the ability to install storage above the basic level. This feature must be installed with EFS - Type C1 (#3622), or Type C2 (#3623). This combination is also a prerequisite to installing the other EFS features (Types C3/ #3625, D1/ #3627, D2/ #3628). Limitations: Cannot be installed on 3274 mdl 1B. Maximum: One. Field Installation: Yes.

**Extended Function Store (EFS) (#3622, #3623, #3625, #3627, #3628):** #3622 is for Type C1 -- #3623 is for Type C2 -- #3625 is for Type C3 -- #3627 is for Type D1 -- #3628 is for Type D2. Provide increments of control storage to accommodate combinations of functional features that exceed the storage capacity of the base machine. Types C1, C3, and D1 each provide 16,384 additional positions of control storage. Types C2 and D2 each provide 32,768 additional positions of control storage. To determine which EFS features may be required, refer to the 3274 Control Storage Requirements in Tables 1 and 2 below.

**Note:** A description of non-"Specify", non-"Feature", non-"Machine" Control Storage Requirement Functions is given later in this section, with the exception of "Category A Terminals", "Category B Terminals", EBCDIC, and ASCII, which have been described above.

**3274 Control Storage Requirement Tables:** Use the following procedure to determine which, if any, EFS features must be ordered on the mdl 1A, 1C or 1D:

- Select the Configuration Support option which contains the functions desired. If T is selected, go directly to Table 2, line 6, for EFS feature codes needed, otherwise continue to Step #2.
- After determining the desired Configuration Support, refer to the appropriate part of Table 1 and select the features desired:
  - 3274 mdl 1A, refer to Table 1, Part 1.
  - 3274 mdl 1C/SNA, refer to Table 1, Part 2.
  - 3274 mdl 1C/BSC, refer to Table 1, Part 3.
  - 3274 mdl 1D, refer to Table 1, Part 4.
- Determine the total Type C and total Type D storage required for the features and functions selected in Step #2.
- Add the Type C and Type D totals to determine the total control storage required. If the total is equal to or less than 65,536, no EFS features are required. If the total is greater than 65,536, continue with Step #5.
- Refer to Table 2. For Configuration Support A or B, begin at line 1 and work down. For C, begin at line 4 and work down. Stop at the first line that satisfies the control storage requirements determined in Steps 3 and 4. Order the EFS features listed in the last column.

### Notes For Table 1 - Parts 1, 2, 3 and 4:

- Configuration Support A Consideration Only: If all three keyboard types (Typewriter, Data Entry and Data Entry-Keypunch-like) are required on display stations attached to the 3274, add 1000 to the Type D storage requirements in addition to that listed in the table.
- If the total Type D storage requirement calculated for Category A, plus Category B terminals, exceeds the applicable maximum storage value listed below, use the applicable maximum value.

- | Unit        | Maximum Storage Value |
|-------------|-----------------------|
| 3274-1A     | 10,744                |
| 3274-1C/SNA | 10,744                |
| 3274-1C/BSC | 6,844                 |
| 3274-1D     | 8,844                 |
- There is no customizing option nor additional control storage required to support 10 Numeric-only Character Set for Operator Identification Card Reader (#4600) on 3277s (Category B terminals) which are attached to a 3274.
  - Add the indicated amount for each keyboard type to be used.
  - The SFAP function is also required when the SCS Support for SFAP (#9661) feature is to be used on 3287 mdls 1, 2, 1C or 2C.
  - SCS Printer Support is required for DCA-LV2 Word Processing applications. This support also required for 5210 mdls G01 or G02, attached to 3274 mdls 1A and 1C SNA for applications that utilize the cut sheet feed attachment feature (#7860) when operating with 2 drawers.
  - Configuration Support C (#9112) is required for 5210 mdls G01, G02 attached to 3274 mdls 1A and 1C SNA for support of Word Processing applications. This includes those applications which utilize the cut sheet feed attachment feature (#7860) when operating with 2 drawers.
  - The SFAP function is also required when the Query function is used with 3262 mdls 3 and 13, 3268 mdl 2, printers. The Query function allows the application to interrogate the printer to determine what function is supported.
  - For 4250 attachment to 3274 mdls 1A and 1D, the SFAP function is required plus support for one Extended Attribute Terminal for each 4250 attached.
  - SCS printer support required for 4250 attachment.
  - A Displaywriter System requires two terminal ports when it includes a printer.

TABLE 1 - PART 1

3274 Model 1A	TYPE C	TYPE D
Mdl 1A Base (including copy) (Choose one)		
Configuration Support A (#9110)	41,200	13,600
Configuration Support B (#9111)	45,072	14,484
Configuration Support C (#9112)	50,030	17,940
Category A terminals (Choose one) (2,11)		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144
Keyboards on Cat. A terminals (select all that apply, choosing at least one) (4)		
Typewriter(1) (3278/3279-#4621, #4624, #4627, #4628, #4640, #4651, 3178 mdl C2)	0	786
3191 Display Station	0	786
3192 Display Station	0	786
3270 Personal Computer Control Unit Terminal Mode	0	786
Typewriter(1) (3178 mdl C3)	0	786
Typewriter(1) (3178 mdl C4)	0	786
Data Entry(1) (3278/3279-#4622, 3178 mdl C1)	0	786
Data Entry KP(1) (3278/3279-#4623)	0	786
Text (3278/3279-#4629)	0	1,560
APL (3180 mdl 130, 3278/3279-#4626, #4652)	0	1,560
Canadian French Keyboards		

MACHINES

TABLE 1 - PART 2

(any)	500	150
Typewriter (1) (3278/3279-#4621,#4624,#4627,#4628,#4640,#4651)	0	1,042
Data Entry(1) (3278/3279-#4622)	0	1,042
Data Entry KP(1) (3278/3279-#4623)	0	1,042
APL (3180 mdl 130, 3278/3279-#4626, #4652)	0	1,816
Japanese Katakana Keyboards		
Typewriter (3278/3279-#2715, #2717,#2719,#2708, 3178 mdl C2)	0	1,304
Data Entry (3278/3279-#2716, 3178 mdl C1)	0	1,304
APL (3180 mdl 130, 3278/3279-#2718,#2721)	0	2,072
-----		
Category B terminals		
(Choose one)(2,3)		
1 to 4 terminals	4,900	5,624
1 to 8 terminals	4,900	6,648
1 to 12 terminals	4,900	7,672
1 to 16 terminals	4,900	8,696
APL/Text Control Function		
(Choose one)		
Configuration		
Support A or B	1,700	1,200
Configuration		
Support C	0	0
3289 Text Print Control	0	512
Host-Loadable Printer Authorization Matrix	500	0
Between Bracket Printer Sharing	800	100
SCS Printer Support (3287-#9660,#9661)(5,10) (3262 and 3268 basic function) (8), (3289 basic function), (4250 basic function)(9), (5210 basic function) (6,7)	1,500	100
Magnetic Rdr Ctrl (3278/3279-#4999) (Choose one)		
3275/3277-Like 10-Ch Set	600	60
Num & Alpha Char Sets	1,630	316
Color Convergence (Base or Extended Color)	4,296	1,198
Alert Function	2,544	4,224
-----		
The Following Are Available w/Configuration Support C Only:		
Structured Field & Attribute Processing (SFAP)	4,950	950
Programmed Symbols(PS)	2,700	190
Decompression	900	0
Extended Attribute Terminals (add 256 for each terminal) (3268 mdl 2C/3278/3287-#3610/3279 mdl 2B or 3B)	0	#x256
(Canada only)		
IBM Personal Computer Support Attachment (3278/3279-#5315,#5316/#5325, #5326)	3,200	300
<)		

3274 Model 1C/SNA	TYPE C	TYPE D
-----		
Mdl 1C/SNA (including copy) (Choose one)		
EBCDIC		
Conf. Support A (#9110)	41,030	13,700
Conf. Support B (#9111)	46,102	15,096
Conf. Support C (#9112)	50,580	17,940
-----		
Category A Terminals		
(Choose one)(2,11)		
1 to 8 terminals		
(included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144
Keyboards on Cat. A terminals		
(select all that apply, choosing at least one)(4)		
Typewriter(1) (3278/3279-#4621,#4624,#4627,#4628,#4640,#4651, 3178 mdl C2)	0	786
3191 Display Station	0	786
3192 Display Station	0	786
3270 PC Control Unit		
Terminal Mode	0	786
Typewriter(1) (3178 mdl C3)	0	786
Typewriter(1) (3178 mdl C4)	0	786
Data Entry(1) (#3278/3279-#4622, 3178 mdl C1)	0	786
Data Entry(1) KP		
(3278/3279-#4623)	0	786
Text (3278/3279-#4629)	0	1,560
APL (3180 mdl 130, 3278/3279-#4626,#4652)	0	1,560
Canadian French Keyboards		
(any)	450	150
Typewriter(1) (3278/3279-#4621,#4624,#4627,#4628,#4640,#4651)	0	1,042
Data Entry(1)		
(3278/3279-#4622)	0	1,042
Data Entry KP(1)		
(3278/3279-#4623)	0	1,042
APL (3180 mdl 130, 3278/3279-#4626,#4652)	0	1,816
Japanese Katakana Keyboards		
Typewriter (3278/3279-#2715, #2717,#2719,#2708, 3178 mdl C2)	0	1,304
Data Entry (3278/3279-#2716, 3178 mdl C1)	0	1,304
APL (3180 mdl 120, 3278/3279-#2718,#2721)	0	2,072
-----		
Category B terminals		
(Choose one)(2,3)		
1 to 4 terminals	4,900	5,624
1 to 8 terminals	4,900	6,648
1 to 12 terminals	4,900	7,672
1 to 16 terminals	4,900	8,696
APL/Text Control Function		
(Choose one)		
Conf. Support A or B	1,700	1,200
Conf. Support C	0	0
3289 Text Print Control	0	512
High-Perf. Comm. Adapter (#6303) (Choose one)		
Conf. Support A or B	600	-500
Conf. Support C	600	+400
Host-Loadable Printer		

## MACHINES

Authorization Matrix	500	0
Between Bracket Ptr Sharing	800	100
SCS Printer Support (3287- #9660,#9661)(5), (3262 and 3268 basic function)(8), (3289 basic function), (5210 basic function)	1,600	100
Magnetic Rdr Ctrl (3278/ 3279-#4999) (Choose one)		
3275/3277-Like 10-Ch Set	600	60
Num & Alpha Char Sets	1,630	316
Encrypt/Decrypt (#3680)	3,200	2,000
Color Convergence (Base or Extended Color)	4,296	1,198
Alert Function	2,544	4,224

The Following Are Available w/  
Configuration Support C Only:

Structured Field & Attri- bute Processing (SFAP) (EBCDIC only)	4,950	950
Programmed Symbols (PS)	2,700	190
Decompression	900	0
Extended Attribute Termi- nals (add 256 for each terminal) (3268 mdl 2C/ 3278/3287-#3610/3279 mdl 2B or 3B)	0	#x256
(Canada only)		
IBM PC Support Attachment (3278/3279-#5315,#5316/ #5325,#5326)	3,200	300

TABLE 1 - PART 3

3274 Model 1C/BSC	TYPE C	TYPE D
Mdl 1C/BSC (Choose one)		
EBCDIC		

Conf. Support A (#9110)	38,000	13,800
Conf. Support B (#9111)	41,872	14,684
Conf. Support C (#9112)	47,150	22,200

Category A Terminals (Choose one)(2,11)		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096
1 to 32 terminals	0	6,144

Keyboards on Cat. A terminals (select all that apply, choosing at least one)(4)		
Typewriter(1) (3278/3279- #4621,#4624,#4627,#4628, #4640,#4651, 3178 mdl C2)	0	786
3191 Display Station	0	786
3192 Display Station	0	786
3270 PC Control Unit		
Terminal Mode	0	786
Typewriter(1) (3178 mdl C3)	0	786
Typewriter(1) (3178 mdl C4)	0	786
Data Entry(1) (3278/3279- #4622, 3178 mdl C1)	0	786
Data Entry KP(1) (3278/3279-#4623)	0	786
Text (3278/3279-#4629)	0	1,560
APL (3180 mdl 130, 3278/3279-#4626,#4652)	0	1,560
Canadian French Keyboards (any)	450	150

Typewriter(1) (3278/3279- #4621,#4624,#4627,#4628, #4640,#4651)	0	1,042
Data Entry(1) (3278/3279-#4622)	0	1,042
Data Entry KP(1) (3278/3279-#4623)	0	1,042
APL (3180 mdl 130, 3278/3279-#4626,#4652)	0	1,816
Japan Katakana Keyboards	0	0
Typewriter (3278/3279-#2715, #2717,#2719,#2708, 3178 mdl C2)	0	1,304
Data Entry (3278/3279- #2716, 3178 mdl C1)	0	1,304
APL (3180 mdl 130, 3278/ 3279-#2718,#2721)	0	2,072

Category B terminals (Choose one)(2,3)		
1 to 4 terminals	4,700	1,724
1 to 8 terminals	4,700	2,748
1 to 12 terminals	4,700	3,772
1 to 16 terminals	4,700	4,796

APL/Text Control Function (Choose one)		
Conf. Support A or B	2,200	4,700
Conf. Support C	0	0
3289 Text Print Control	0	512
Host-Loadable Printer		
Authorization Matrix	550	0
Copy (Print Key Function)	2,700	0
Magnetic Rdr Ctrl (3278/ 3279-#4999) (Choose one)		
3275/3277-Like 10-Ch Set	600	60
Num & Alpha Char Sets	1,630	316
Color Convergence (Base or Extended Color)	4,296	1,198

The Following Are Available w/  
Configuration Support C Only:

Structured Field & Attri- bute Processing (SFAP) (EBCDIC only)	4,950	950
Programmed Symbols (PS)	2,700	9,610
Decompression	900	0
Extended Attribute Terminals (add 256 for each terminal) (3268 mdl 2C/3278/3287- #3610/3279 Mdl 2B or 3B)	0	#x256
(Canada only)		
IBM PC Support Attachment (3278/3279-#5315,#5316/ #5325,#5326)	3,200	300

TABLE 1 - PART 4

3274 Model 1D	TYPE C	TYPE D
Mdl 1D Base (including copy) (Choose one)		
Conf. Support A (#9110)	34,500	17,000
Conf. Support B (#9111)	38,372	17,884
Conf. Support C (#9112)	39,720	24,900
Category A terminals (Choose one)(2,11)		
1 to 8 terminals (included in base)	0	0
1 to 16 terminals	0	2,048
1 to 24 terminals	0	4,096

1 to 32 terminals	0	6,144
Keyboards on Cat. A terminals (select all that apply, choosing at least one)(4)		
Typewriter(1) (3278/3279- #4621,#4624,#4627,#4628, #4640,#4651, 3178 mdl C2)	0	786
3191 Display Station	0	786
3192 Display Station	0	786
3270 PC Computer Control Unit Terminal Mode	0	786
Typewriter(1) (3178 mdl C3)	0	786
Typewriter(1) (3178 mdl C4)	0	786
Data Entry(1) (3278/3279- #4622, 3178 mdl C1)	0	786
Data Entry KP(1) (3278/3279-#4623)	0	786
Text (3278/3279-#4629)	0	1,560
APL (3180 mdl 130, 3278/ 3279-#4626,#4652)	0	1,560
Canadian French Keyboards (any)	500	150
Typewriter(1) (3278/3279- #4621,#4624,#4627,#4628, #4640,#4651)	0	1,042
Data Entry(1) (3278/3279-#4622)	0	1,042
Data Entry KP(1) (3278/3279-#4623)	0	1,042
APL (3180 mdl 130, 3278/ 3279-#4626,#4652)	0	1,816
Japanese Katakana Keyboards		
Typewriter (3278/3279-#2715, #2717,#2719,#2708, 3178 mdl C2)	0	1,304
Data Entry (3278/3279- #2716, 3178 mdl C1)	0	1,304
APL (3180 mdl 130, 3278/ 3279-#2718,#2721)	0	2,072
-----		
Category B terminals (Choose one)(2,3)		
1 to 4 terminals	4,300	3,724
1 to 8 terminals	4,300	4,748
1 to 12 terminals	4,300	5,772
1 to 16 terminals	4,300	6,796
APL/Text Control Function (Choose one)		
Conf. Support A or B	1,700	4,600
Conf. Support C	0	0
Copy (Print Key Function)	2,700	0
3289 Text Print Control	0	512
Host-Loadable Printer Authorization Matrix	550	0
Magnetic Rdr Ctrl (3278/ 3279-#4999) (Choose one)		
3275/3277-Like 10-Ch Set	600	60
Num & Alpha Char Sets	1,120	316
Color Convergence (Base or Extended Color)	4,296	1,198

The Following Are Available w/  
Configuration Support C Only:

Structured Field & Attribute Processing (SFAP)(9)	4,950	950
Programmed Symbols (PS)	2,700	190
Decompression	900	0
Extended Attribute Terminals (add 256 for each terminal) (3268 mdl 2C/ 3278/3287-#3610/3279 mdl		

2B or 3B/4250)  
(Canada only)  
IBM PC Support Attachment  
(3278/3279-#5315,#5316/  
#5325,#5326)  
3,200 300

TABLE 2

#	FACTORS	SIZE	FEATURE CODES
1	Type C + D	LT/= 65,536	None
2	Type C + D and Type C and Type D	GT 65,536 LT/= 49,152 LT/= 32,768	#1801 + #3622
3	Type C + D and Type C and Type D	GT 65,536 LT/= 49,152 LT/= 49,152	#1801, #3622, #3627
4	Type C + D and Type C and Type D	GT 65,536 LT/= 65,536 LT/= 32,768	#1801, #3622, #3625; or #1801, #3623
5	Type C + D and Type C and Type D	GT 65,536 LT/= 65,536 LT/= 49,152	#1801, #3622, #3625, #3627; or #1801, #3623, #3627
6	Type C + D and Type C and Type D	GT 65,536 LT/= 65,536 GT 49,152	#1801, #3622, #3625, #3628; or #1801, #3623, #3628
7	Type C and Type C and Type D	GT 65,536 LT/= 71,680 Any	#1801, #3622, #3625, #3628; or #1801, #3623, #3628
8	Type C	GT 71,680	Invalid Configuration

**EFS-Type C1 (#3622):** (Mdl 1A, 1C, 1D) Provides 16,384 positions of additional control storage. Maximum: One. Field Installation: Yes. Prerequisites: #1801. Limitations: Cannot be installed with #3623.

**EFS-Type C2 (#3623):** (Mdl 1A, 1C, 1D) Provides 32,768 positions of additional control storage. Maximum: One. Field Installation: Yes. Prerequisites: #1801. Limitations: Cannot be installed with #3622.

**EFS-Type C3 (#3625):** (Mdl 1A, 1C, 1D) Provides 16,384 positions of additional control storage. Maximum: One. Field Installation: Yes. Prerequisites: #3622. Limitations: Field Installation only.

**REFS-Type D1 (#3627):** (Mdl 1A, 1C, 1D) Provides 16,384 positions of additional control storage. Maximum: One. Field Installation: Yes. Prerequisites: #3622 or #3623.

**EFS-Type D2 (#3628):** (Mdl 1A, 1C, 1D) Provides 32,768 positions of additional control storage. Maximum: One. Field Installation: Yes. Prerequisites: #3622 or #3623.

## NON-COMMUNICATIONS FEATURES

**Encrypt/Decrypt (#3680):** Provides the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt feature (#6010, #5735-RC2) or ACF/TCAM Version 2 (5735-RC3) and either the 3848 and the OS/VS1 and OS/VS2 MVS Cryptographic Unit Support Program Product (5740-XY6), or the

OS/VS1 and OS/VS2 MVS Programmed Cryptographic Facility Program Product (5740-XY5), data transmitted over unprotected communications lines can be safeguarded through cryptography. Limitations: (1) 3274 mdl 1C (SDLC only). (2) Mutually exclusive with X.25. The cryptographic feature cannot be used with X.25 operation. Maximum: One. Field Installation: Yes. Note: A mercury battery, P/N 1743456, or equivalent, is needed. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement or the discharged battery is the customer's responsibility. The discharged IBM battery should be returned to IBM.

**(Canada only > Waterproof Power Connector (#8801):** (Mdl 1A, 1B, 1D) Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type termination in specific locations. See "Specify" for cable length to be ordered. Limitations: The only valid Voltage Specify codes are #9884 and #9894. One of these two codes must be specified when ordering this feature. Maximum: One. Field Installation: Not recommended. <)

#### COMMUNICATION ADAPTERS

**Common Communication Adapter W/O Business Machine Clock (#6302):** (Mdl 1C) Required for communications at speeds up to 9600 bps (see "Limitations" below when a terminal Adapter(s) Type B (#7802-#7805) is installed). SNA/SDLC and BSC transmission control protocols are supported. Clocking must be provided by the modem or communications facility. Limitations: (1) #6303 must be ordered/installed in lieu of this feature, if SNA/SDLC protocol is required with a line speed greater than 7200 bps and a Category B Terminal Adapter(s) (#7802-#7805) is installed. (2) This feature cannot be ordered/installed with #6303. Maximum: One. Field Installation: Yes.

**High-Performance Communications Adapter (#6303):** (Mdl 1C) When SNA/SDLC protocol is required with a line speed of 9600 bps and a Category B Terminal Adapter(s) is installed, or with a line speed greater than 9600 bps or for X.25 support, this feature is required for attachment to the communications lines through either an IBM or a non-IBM modem with its own clocking. Limitations: (1) With this feature installed, operation is restricted to SNA/SDLC protocol. IML for BSC protocol is no longer possible. (2) This feature cannot be ordered/installed with #6302. Maximum: One. Field Installation: Yes.

#### COMMUNICATIONS INTERFACES

**CCITT V.35 Interface (#1550):** (Mdl 1C) Provides a cable and a CCITT interface for attachment to an external modem or other DCE complying with CCITT Recommendation (1976) V.35, ISO Standard 2593, other relevant CCITT Recommendations, and provides clocking of up to 56K bps. Attachment to non-IBM DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3705 at speeds up to 57.6K bps. See "Specify" section for communication cable length. Limitations: (1) Cannot be installed with any other communications Interface Feature. (2) BSC is not supported at speeds greater than 9600 bps. Maximum: One. Field Installation: Yes. Prerequisites: (1) #6302 or #6303 for communications up to 9600 bps. (2) #6303 for communications above 9600 bps or for X.25 operation up to a maximum of 9600 bps. Note: Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

**External Modem Interface (#3701):** (Mdl 1C) Provides a cable and a CCITT interface for attachment to an external IBM modem or PTT-mandatory modem complying with CCITT Recommendation (1976) V.24, V.28, ISO Standard 2110, and other relevant CCITT Recommendations that provides clocking of up to 9600 bps. Attachment to a non-IBM modem or other DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 4331 Processor at speeds up to 9600 bps (up to 14.4K bps when used with 5866 or 5868 mdl 18 modems). See "Specify" for communication cable length. Limitations: Cannot be installed with any other Communications Interface feature. Maximum: One. Field

Installation: Yes. Prerequisites: #6302 or #6303. #6303 is required for X.25 operation.

**(Japan only > X.21 Adapter For Nonswitched Networks (#5655):** (Mdl 1C) An interface adapter for SDLC data transmission at speeds of 2400, 4800, 9600 or 48K bps through X.21 nonswitched data communication equipment. See "Specify" section for communication cable length. Limitations: (1) Cannot be ordered with any other Communications Interface feature. (2) Does not support BSC transmission control protocol. Maximum: One. Field Installation: Yes. Prerequisites: (1) #6302 or #6303 for communications up to 9600 bps. (2) #6303 for communications at 48K bps or for X.25 operation up to a maximum of 9600 bps. Note: Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available. <)

#### TERMINAL ADAPTERS

**Terminal Adapter Type A1, A2, A3 (#6901, #6902, #6903):** One each of these adapters can be installed. Each adapter provides for the attachment of an additional eight Category A terminals. It should be noted that two terminal ports are required to attach a Displaywriter System when it includes a printer. The base control unit, which provides for attachment of eight Category A terminals, can be expanded with these three terminal adapters to a maximum configuration of 32 Category A terminals. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type A1 (Terminals 9-16) - #6901  
 Terminal Adapter Type A2 (Terminals 17-24) - #6902  
 Terminal Adapter Type A3 (Terminals 25-32) - #6903

Limitations: #6903 is mutually exclusive with #7804 and #7805. Maximum: One of each type terminal adapter. Field Installation: Yes. Prerequisites: #6902 requires #6901 - #6903 requires #6902. Note: To attach Category A terminals via the 3299, refer to RPQ 8K1156.

**Terminal Adapter Type B1 (#7802):** Permits the attachment of four Category B terminals and provides for the installation of Terminal Adapter Types B2, B3 and B4 when additional Category B terminals are desired. Maximum: One. Field Installation: Yes. Note: When installed on a 3274 mdl 1A, or on a 3274 mdl 1C/SNA, EFS feature(s) (#3622, #3625, #3627) and Control Storage Expansion (#1801) are required. See "3274 Control Storage Requirements Tables" under EFS features to accurately determine what storage features are required on 3274 mdls 1A, 1C and 1D in specific configurations.

**Terminal Adapter Type B2, B3, B4 (#7803, #7804, #7805):** Each of these terminal adapters permits the attachment of four additional Category B terminals. A maximum of one each of these terminal adapters can be installed for a combined total of 12 additional or 16 total Category B terminals attached to a control unit. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type B2 (Terminals 5-8) - #7803  
 Terminal Adapter Type B3 (Terminals 9-12) - #7804  
 Terminal Adapter Type B4 (Terminals 13-16) - #7805

Limitations: #7804 and #7805 are mutually exclusive with #6903. Maximum: One of each type terminal adapter. Field Installation: Yes. Prerequisites: #7802.

#### CONTROL STORAGE FUNCTIONS

**APL/Text Control Function:** This function, selectable during the customization of a 3274 mdl 1A, 1C or 1D, expands the character handling capability of the 3274 to accommodate the APL, Text, and graphic plot character sets on 3278s, 3268 mdl 2, 3262s (text only), 3279, and 3287s attached via Type A Terminal Adapters (#6901, #6902, #6903).

**Note:** The 3274, with or without this APL/Text control function, does NOT support the 3270 Data Analysis/APL Feature (#1066) on attached 3277s or 3284, 3286 or 3287s, NOR does it support the Text Print Feature (#7880) on attached 3288s.

**3289 Text Print Control Function:** This function, selectable during customization of a 3274 mdl 1A, 1C, or 1D, extends the character handling capability of the 3274 to accommodate the text characters (English US only) for the text print feature (#1130) on attached 3289s.

**Copy Function:** This function, selectable during the customization of a 3274 mdl 1C (BSC) or 1D, enables the copying of the screen contents of an attached 3178 or 3278 to an attached 3268, 3287, 3289, 3262, 5210 through use of the Local Print Key on the display keyboard. This function is provided as basic on the 3274 mdls 1A, 1B and 1C (SNA). The ability to perform host initiated local copies from a 3178, 3278, or 3279, to a 3268, 3287, 3289, 3262, 5210 attached to a 3274 mdl 1A or 1C (SNA) is also provided as basic. In addition, the 3274 mdl 1C (BSC) supports the 3270 host Copy command as basic.

#### Local Copy Summary

3274 Mdl	Print Key	Host Initiated
1A	Basic	Basic
1B	Basic	Not Applicable
1C (BSC)	Cust. Option	Basic
1C (SNA)	Basic	Basic
1D	Cust. Option	Not Applicable

Note: The 3274 does not support copying the screen contents of an attached display station to an attached 4250.

**Host-Loadable Print Authorization Matrix:** This function, selectable during the 3274 customization process, provides the capability for the 3274, during subsequent IBM procedures, to receive, from a user-written application program at the host CPU, an updated Printer Authorization Matrix to override the matrix created by the customization operator or by system default.

**Between Bracket Printer Sharing Function:** This function, selectable during the customization of a 3274 mdl 1A or 1C (SNA), enables attached 3268s, 3287s, 3289s, 3262s, 5210s, to be used as Local Copy output devices for the screen contents of attached 3178, 3278 and 3279s, when the printers are Between Brackets with the host application program. Printers are available for Local Copy operations only when they are not in session with an application program if this option is not selected.

**Color Convergence Function:** This function, selectable during the customization of any mdl 3274, provides the mechanism through which the operator of a 3279 can perform color convergence for the 3279.

**SFAP Function:** This function, selectable during the customization of any mdl 3274 except mdl 1B, provides a new 3270 command and several new orders that extend the functional capabilities of appropriately featured 3278, 3279, 3287, 3262, 3268 terminals. Data Streams sent to these attached terminals can include extended color, extended highlighting, or Programmed Symbols, in any combination. Prerequisites: BSC hosts that utilize this function must transmit in transparent-text mode.

**Programmed Symbols (PS) Function:** This function, selectable during the customization of any mdl 3274 except mdl 1B, enables the customer to define, store, and access up to six, 190-symbol sets on appropriately featured 3278s, 3279s, 3268 mdl 2C and 3287s. Prerequisites: SFAP.

**Decompression Function:** This function, selectable during the customization of any mdl 3274 except mdl 1B, decompresses data streams containing compressed Programmed Symbols generated by the Graphical Data Display Manager (GDDM) program product. Its usage is recommended for all 3274 TP host attachments that use GDDM. Prerequisites: SFAP.

**Extended Attribute Terminals:** This function, selectable during the customization of any mdl 3274 except mdl 1B, establishes an internal control table for each terminal on which Extended Color, Extended Highlighting, and Programmed Symbols, will be used or when a 4250 will be attached. If more extended attribute terminals are attached to the 3274 than are specified during customization, the excess terminals will execute only base-level function. Prerequisites: SFAP.

**X.25 Support:** (Mdl 1C) This function, through the use of Configuration Support P (#9116) on a 3274 mdl 1C, provides for attachment to X.25 data transmission services having an interface which complies with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). IBM conformance to this X.25 interface is defined in "IBM General Information Manual - The X.25 Interface for Attaching IBM SNA nodes to Packet - Switched Data Networks", GA27-3345. Keyboard labels on attached 3178s, 3278s or 3279s keyboards and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. See "X.25 Keyboard Labels" under "Accessories" for details on the labels required for selected keyboards on terminals connected to a 3274 attached to a X.25 communications facility. Limitations: #3680 is mutually exclusive with 3274 X.25 capability. The cryptographic feature cannot be used with X.25 operation. Prerequisites: (1) Configuration Support P. (2) SNA/SDLC protocol. (3) Configuration Support P requires 128K of control storage. (4) One of the following Communications Interfaces: #3701, #5655 or #1550. Note: The maximum line speed supported with any of these Communications Interface features is 9600 bps with X.25. The Communications Interface feature required depends upon the X.25 physical interface provided by the network. (5) #6303.

**(Canada only > IBM Personal Computer Attachment Support:** This function, selectable during the customization of any mdl 3274, except mdls 1B and 21X, provides support for attachment of an IBM Personal Computer to a 3278 or 3279. Prerequisites: SFAP. <)

**3274 Entry Assist RPQ:** This RPQ provides capabilities which facilitate entry and editing of text material. The capabilities include margins, tabbing, word-wrap, improved cursor positioning, improved character and word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist RPQ is intended for use with a specific set of host editor programs. See RPQ 8K1147 Description and Price Transmittal for storage requirements and prerequisites. 3274 Entry Assist RPQ is supported for the following keyboard languages/character sets: Brazilian, Canadian Bilingual 125-character set RPQ, International, Japanese English, Spanish Speaking, English UK, and English US.

**Alert Function:** This function, selectable during the customization of 3274 mdls 1A and 1C/SNA reports problem determination data to the host, for recording and display, when NPDA Version 3 is installed in the host.

#### MODEL CONVERSIONS

See table below for field installation of model changes.

From Model	To Model					
	1A/B/D	1C	21A/B/D	21C	31A/D	31C
1A/B/D	Yes (1)	No	NR	No	Yes	No
1C	No	-	No	NR	No	Yes
21A/B/D	NR	No	Yes (1)	No	Yes	No
21C	No	NR	No	-	No	Yes
31A/D	NR	No	NR	No	Yes	No
31C	No	NR	No	NR	No	-

NR = Field Installation NOT recommended.

#### Notes:

- When making model changes, the applicable Control Storage Requirement Table must be used to determine if sufficient control storage is available. Also, when changing models, refer to FIVE3270 to evaluate expected performance.
- Customers who have ordered, or plan to order for purchase, IBM 3274 models 1A/B/C/D and anticipate later upgrading to models 31A/C/D should consider purchase of models 21A/B/C/D initially, because field upgrade of models 1A/B/C/D requires replacement of the base storage at an additional cost.

**MACHINES****ACCESSORIES**

**Battery, Mercury:** To provide power to sustain the master key of the Encrypt/Decrypt feature #3680 on the 3274 when normal power is not present. A 4.14 volt mercury battery (P/N 1743456). This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered from IBM. by DP Supply Order from Mechanicsburg. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

**X.25 Keyboard Labels:** Stick-on labels are used on the keyboards of 3178s, 3278s and 3279s attached to a 3274 mdl 1C using X.25 communications facilities. These labels are normally provided with Configuration Support P (#9116). If new or additional labels are required, they can be obtained by ordering Form Number GX23-0285. Each form number is a sheet containing 16 sets of stick-on labels, enough for 16 keyboards, and the installation procedure for installing the labels.

**SUPPLIES (NONE)**

## 3274 CONTROL UNIT MODELS 21, 31, 51C

### PURPOSE

Provides the capability of attaching 3270 Information Display System displays and printers to System/3, S/360, S/370, 4300, 303X, 3081, 308X, 3090 processors, 8100 Information System and the 9370 Processor. Models 21A, 21B, 21D, 31A and 31D are for local channel attachment. Models 21C, 31C and 51C are used for communicating in data half-duplex mode via half-duplex or duplex communications facilities.

For S/3 attachment, each of the control units can communicate via Binary Synchronous Communications (BSC) in data half-duplex mode over half-duplex or full duplex communications facilities with a suitably equipped S/3 mdl 4, 8, 10, 12, or 15 at speeds up to 9600 bps.

### ATTACHABLE TERMINALS

#### Category A Terminals

- 3178 mdl C1, C2: Display Station
- 3178 mdl C3, C4: Display Station (see Note 6)
- 3179 mdl 1: Color Display Station
- 3179 mdl G: Color Graphics Display Station
- 3180 mdl 1: Display Station
- 3191 (See M3191 pages for models): Display Station
- 3192 (See M3192 pages for models): Display Station
- 3193 mdl 1, 2: Display Station (see Note 10)
- 3262 mdl 3, 13: Line Printer
- 3268 mdl 2: Impact Matrix Printer
- 3268 mdl 2C: Color Impact Matrix Printer
- 3270 Personal Computer Control Unit Terminal Mode (See Note 2): 3270 Personal Computer Distributed Function Mode
- 3278 mdl 1, 2, 3, 4, 5: Display Station (see Note 1)
- 3279 (except mdl 2C): Color Display Station
- 3287 mdl 1, 2 w/#8331: Impact Matrix Printer
- 3287 mdl 1C, 2C: Color Impact Matrix Printer
- 3289 mdl 1, 2: Line Printer
- 3290 (see Note 2): Information Panel Display
- 4224 mdl 201, 202, 2E2: Impact Matrix Printer (See notes 7 and 9)
- 4224 mdl 2C2: Color Impact Matrix Printer (See notes 8 and 9)
- 4234 mdl 1: Dot Band Printer
- 4245 mdl D12, D20: Line Printer
- 4250: APA Printer (see Notes 3 and 4)
- 5150: Personal Computer (via 3278/79 Emulation Adapter)
- 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode): Personal Computer XT/370 (See Note 2)
- 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode): Personal Computer AT/370 (See Note 2)
- (Canada only) >5160 mdl 589 (Control Unit Terminal Mode only): Personal Computer XT/370 (See Note 2)
- 5170 mdl 599 and mdl 739 (Control Unit Terminal Mode only): Personal Computer AT/370 (See Note 2) <)
- 5210 mdl G1, G2: Printwheel Printer
- 6850 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and LP 5608-SR9 (see Note 5): Displaywriter System

#### Notes:

1. Mdl 5 or a 3180 mdl 1 emulating a mdl 5 cannot be attached to a 3274 mdl 21 or a mdl 51C without Extended Function Store #1800.
2. 3274 Mdl 31X and 51C.
3. 4250 cannot attach to 3274 mdl 21X. Attachment to 3274 mdls 31C and 51C requires printer RPQ 7B0980.
4. Because of the high data volumes possible with this printer, it is strongly recommended that the "IBM 3274 Performance Guidelines, Technical Bulletin", Z220-4167, IBM be consulted to predict the effect the 4250 has on subsystem performance.

5. Two terminals ports are required to attach a Displaywriter System when it includes a printer.
6. Mdl C3 and C4 support requires RPQs. See "Prerequisites" section of the M3178 pages for details.
7. Emulates 3268 mdl 2.
8. Emulates 3268 mdl 2C except Programmed Symbols are not supported.
9. When attaching the 4224 to a control unit using Configuration Support D at release 65.0, contact the NSD representative for support.
10. RPQ 8K 1311 should be installed on 3274 mdl 31A.

#### Category B Terminals:

- 3277 mdl 1, 2: Display Station
- 3284 mdl 1, 2: Impact Matrix Printer
- 3286 mdl 1, 2: Impact Matrix Printer
- 3287 mdl 1, 2 (with 3271/3272 attachment feature): Impact Matrix Printer
- 3288 mdl 2: Line Printer
- 5160 mdl 568, 588: IBM Personal Computer XT/370
- 5160 mdl 087 with XT/370 Option (1503891): IBM Personal Computer

\* Category B Terminals cannot be attached to a 3274 mdl 21A, and 21C/SNA.

\*\* Category B Terminals cannot be attached to a mdl 51C without Extended Function Store #1800.

Mdl 21s have 64K bytes of control storage and do not support all terminal features. Mdl 31s have 128K bytes of control storage and do support all terminal features, except for limitations on some feature combinations for mdls 31A, 31C/SNA, and 51C (with EFS)/SNA (see "Special Considerations" table with the "Configuration Support Requirements Tables"). The mdl 51C has 64K bytes of control storage with a feature for adding 64K bytes to provide for support of all terminal features.

The basic mdl 21s and 31s allow attachment of up to eight Category A terminals. Two types of terminal adapter features are offered to attach additional terminals. The two types can be ordered in various combinations to attach up to a maximum cluster of 32 terminals -- a maximum of 16 of the terminals can be Category B terminals.

The mdl 51C has 64K bytes for central storage with a feature for adding 64K bytes to provide for support of all terminal features. The basic mdl 51C allows attachment of up to eight Category A terminals. A terminal adapter feature can be used to attach up to four Category B terminals giving a maximum cluster size of 12 terminals.

### MODELS 21, 31, 51

**Model 21A A21; 31A A31:** Models 21A and 31A are no longer available. For local (SNA version) attachment, via a byte multiplexer, selector, or \*block multiplexer channel, to a S/370, 30XX processor; or a 4300 Processor via a byte multiplexer or multiplexer channel.

**Model 21B B21:** Model 21B is no longer available. For local (3272 version) attachment, via a byte multiplexer, selector, or \*block multiplexer channel, to a S/370, 30XX processor, or S/360 mdls 30, 40, 50, 65, 75, and 195; or a 4300 Processor via a byte multiplexer or multiplexer channel.

**Model 21C C21; 31C C31; 51C C51:** Models 21C and 31C are no longer available. For communicating in data half-duplex mode over half-duplex or duplex communications facilities with the following:

- A S/370, 30XX, 4300 or 9370 Processor via 3704, 3705, or 3725 (or via the Communications Adapter feature on the 4321 or 4331 or via Telecommunications Subsystems Controller on the 9370), using Synchronous Data Link Control (SDLC/SNA).

- A S/370, 30XX, 4300 or 9370 Processor via (where applicable) 2701, 2703, a 3704, 3705, or 3725, or a Communications Adapter feature on the 4321, 4331 or a Telecommunications Subsystem Controller on the 9370, using BSC.
- S/370 mdls 115, 125, 135 and 138 via Integrated Communications Adapter (ICA) using BSC.
- S/360 mdls 30, 40, 50, 65, 75, and 195 via 2701, 2703, or a 3704 or 3705 using BSC.
- 4331/4361 Processor - The model 51C can also attach to a 4331 via a direct- or data link-attached loop using SDLC.
- A 4341, 4361, 4381, 303X, 308X or 3090 processor via 3720 using Synchronous Data Link Control (SDLC/SNA) or BSC.
- 8100 Information System - The model 51C can attach using SDLC via a data link or a direct-attached or data link-attached loop.

**Model 21D D21; 31D D31:** Models 21D and 31D are no longer available. For Local (3272 version) attachment, via a byte multiplexer, selector or \*block multiplexer channel, to a virtual storage S/370 processor, or a 4300 processor via a byte multiplexer or block multiplexer channel.

**Note:** Attachment to a non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

**Prerequisites:**

1. One 3178, 3179, 3180-100, 3191, 3192, 3278 or 3279 with keyboard is needed on each 3274 as a diagnostic aid. It must be attached to the first terminal address on the control unit (Port 0).
2. A 3274 mdl 21C or 31C requires a Communications Adapter and a Communication Interface for communications. An external Data Circuit-Terminating Equipment (DCE) is required with the External Modem Interface (#3701) or the CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655) unless the 3274 mdl 21C/31C is to be direct connected. The DCE or direct connected unit to which the 3274 mdl 21C or 31C is attached must provide clocking.
3. The 3274 mdl 51C requires a Communications Adapter and a Communications Interface for host communications. An external DCE may be required with the External Modem Interface (#3701), and the CCITT V.35 Interface (#1550), and the CCITT X.21 Interface (#5655 and #5656).

**Customer Setup (CSU):** The 3274 mdls 21C, 31C, and 51C are Customer Setup, thereby offering the customer early availability and terminal relocation flexibility. The customer is responsible for attaching CSU units to the 3274. For additional information on CSU, refer to GI section, contact IBM.

**HIGHLIGHTS**

These units can attach up to 32 (12 on the mdl 51C) displays, and/or printers, unless a 6580 Displaywriter System, which includes a printer, is to be attached. A Displaywriter System without a printer requires one terminal port (the same as other terminals), but when a Displaywriter System includes a printer, two terminal ports are required to attach. These terminals are grouped into two categories. The basic unit provides for attachment of up to eight of the Category A terminals. Additional terminals are attached via terminal adapter features. The Category A terminals are a display and printers which were developed for attachment to the 3274s, while the Category B terminals were designed for attachment to the 3271s and 3272s. The 3274s attach the Category B terminals with certain limitations. A maximum of four on the mdl 51C or 16 of the 32 attachable terminals on mdls 21 and 31 can be Category B terminals. During a write operation, a 3277 attached to a 3274 via a Type B Terminal Adapter will blink more frequently than when attached to a 3271 or 3272. Category A terminals can be driven up to a maxi-

mum of 610m (2,000 ft) using shielded twisted pair cable or 1,500m (4,920 ft) using coaxial cable. (3289 attaches with coaxial cable only.) Category B terminals can be driven a maximum of 610m (2,000 ft) using coaxial cable or 152m (500 ft) using shielded pair cable. (3284, 3286, and 3288 attach with coaxial cable only.)

The 3274 can communicate with a S/360, S/370, 4300 or 9370 Processor by local channel attach or remotely via communications facilities. The channel-attached Control Units are the mdls 21A and 31A for SNA operation with extended data stream handling capabilities, mdl 21B for 3272-like operation, and mdls 21D and 31D for 3272-like operation with extended data stream handling capabilities. The mdls 21C and 31C can operate with extended data stream handling capabilities using either BSC or SNA/SDLC.

The mdl 51C can also attach via a Data Link to the 8100 Information System or to the 8100 or 4331/4361 via a direct- or data link-attached loop.

The flexibility of 3274s enables the user to configure a display sub-system for initial requirements, and later change hardware and functions to meet future needs. Function configurability is attained through Configuration Support options, via Feature and System Diskettes.

One Feature Diskette, two Systems Diskettes, and (except Canada) a Language Diskette are shipped with each 3274. An Encrypt/Decrypt Feature Diskette is also shipped with the Encrypt/Decrypt feature (#3680) on a 3274 mdl 21C, 31C, or 51C. As part of the installation procedure, a customized System Diskette is generated. The generation process is accomplished by the customer keying in system configuration parameters. A unique configuration table is written on the System Diskette along with the necessary control code to accomplish the functions. For example, during subsequent control unit loading or initialization of a mdl 21C, 31C, or 51C, BSC or SNA/SDLC mode of operation is determined by the configuration recorded on the System Diskette used. It is possible to create two different System Diskettes; one to be used for BSC operation and the other to be used when operating SNA/SDLC.

The control unit is initialized with control code and configuration parameters as a result of Power On or by pressing the IML push-button. The load occurs from an integrated diskette drive using the previously customized System Diskette. The loading process starts with the execution of extended tests contained on the diskette.

The character set to be used on attached terminals is specified on the customized IML Diskette during installation procedure. All attached terminals must have the same character set.

Detailed information for initial customizing, for customizing made necessary by changing configurations, and for optionally updating the diskettes, is contained in the "IBM 3270 Information Display System, IBM 3274 Control Unit Planning, Setup and Customizing Guide", GA27-2827.

**Katakana Support:** The 127-Character (plus space and null) support is an enhancement of previously announced 3270 Japanese Katakana. Katakana terminals will not be 3270 compatible for customers using the NL and EM codes. Customers who do not use the NL and EM codes will be 3274 and 3276 compatible. For detail, see appropriate SRLs.

**COMMUNICATIONS**

The 3274 mdls 21C, 31C, or 51C communicates with a S/370, 4300 or 9370 Processor using SDLC over duplex or half-duplex communications facilities to a 3704, 3705, or 3725 or via the Communications Adapter on the 4321, 4331 or 9370 (SNA/SDLC), or by BSC to a S/360, S/370, 4300 or 9370 Processor, over duplex or half-duplex communications facilities via (where applicable) a 2701, 2703, or a 3704, 3705, 3725 (see Note 1), or the Telecommunications Subsystem Controller on the 9370 Processor. Communications with a 4331 Processor is also provided via a direct- or data link-attached loop for the mdl 51C.

Communications with a S/370 mdl 115, 125, 135, or 138 can also be via the Integrated Communications Adapter (#4640) and appropriate BSC features on a 3115, 3125, 3135, or 3138.

The mdl 51C communicates with the 8100 Information System, using SDLC, via a data link, a direct- or data link-attached loop, or direct connection.

SDLC is used in the 3274-21C or 31C conforms as a subset (unbalanced normal mode) of both the ISO HDLC and ANSI ADCCP standards. For details of this conformance, see "General Information Manual - IBM Synchronous Data Link Control", GA27-3093.

A 3274 mdl 31C or 51C can be used with X.25 communications facilities by using Configuration Support P (#9116), or by customization with Configuration Support D (#9124) (release level 63.1 or higher). Appropriate hardware features must be installed to support the Configuration Support option being used. See "X.25 Support" under "Control Storage Functions" and the Configuration Support P and D descriptions for details.

**Note:** The 3725 is not connectable to a S/360.

**Performance:** For many 3274 mdl 21C, 31C and 51C systems, response time is limited by transmission line speeds. For these cases, applicable line speed upgrades can be translated into immediate response time improvements. However, performance is also data stream dependent. Refer to IBM Aids for performance evaluation information.

**Communications Facilities:** The 3274 mdls 21C, 31C, or 51C communicates with a 4341, 4361, 4381, 303X, 308X or 3090 processor using SDLC or BSC in half-duplex mode over duplex or half-duplex communication facilities to a 3720.

The 3274 mdl 21C, 31C, or 51C operate in half-duplex point-to-point multipoint mode on half-duplex or duplex facilities, using SDLC or BSC, at transmission speeds of 1200/600 (mdl 51C only), (Canada only > 2000, <) 2400/1200, 4800/2400, 7200/3600 and 9600/4800 bps on nonswitched facilities. In addition, the 3274 mdl 51C operates in half-duplex point-to-point mode using SDLC at transmission speeds of 1200/600, 2400/1200 4800/2400, and 9600/4800 bps on switched facilities. See M2700 pages for facilities.

The 3274 mdl 51C also operates in half-duplex mode at 9600 or 38.4K bps over a direct-attached loop, and at 2400, 4800, or 9600 bps over a data link-attached loop.

Multipoint and point-to-point communications at speeds up to 56K bps are also possible where facilities are available. In addition, communications through a 3705, or to the Local Attachment Interface #4801 on the 4331 or to an 8130/8140 Processor can be via direct connection without the need for communications facilities or modems. All communications at speeds greater than 9600 bps must use SDLC. See M3705, 4331, 8101, 8130 and 8140 pages for details.

**Modems:** Unless the 3274 mdls 21C, 31C, or 51C will be direct connected, an external Data Circuit-terminating Equipment (DCE) is required when the External Modem Interface (#3701) or CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655 or #5656) is installed.

Modem	Speed (bps)	Line
3863 mdl 1/2	2400/1200	Nonsw or Sw Voice Grade
3864 mdl 1/2	4800/1200	Nonsw or Sw Voice Grade
3865 mdl 1/2	9600/4800	Nonswitched
3868 mdl 1	2400/1200	Nonsw Voice Grade
3868 mdl 2	4800/2400	Nonsw Voice Grade
3868 mdl 3/4	9600/4800	Nonswitched
3872 mdl 1	2400/1200	Nonsw Voice Grade*
3976 mdl 3	1200/600	Nonsw or Sw Voice Grade**
5811 mdl 10	2400/4800/ 9600	Limited Distance Modem
mdl 18	Rack mount	

		version of mdl 10	
5865 mdl 1		9600/7200/ 4800	Nonswitched
5866 mdl 1		14.4K/12K	Nonswitched
(5865 mode)		9600	Nonswitched
5868 mdl 10		Rack mount version of 5865	
mdl 18		Rack mount version of 5866	
5979 mdl L41		9600	Limited Distance COAM**

\* Canada only

\*\* Except Canada

Switched network backup (SNBU) operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1. 4-wire SNBU operation with Manual Call and Auto Answer is available on the 3863 mdl 1, 3864 mdl 1, and 3865 mdls 1 and 2. For communications capabilities, product utilization and features, see M2700, 3863, 3864, 3865 and 3872 pages.

**Direct Connection Attachment:** In addition to host attachment via modems or other DCE, attachment can be made by direct connect, without the need for intervening DCE. The direct connect is made by using either the External Modem Interface (#3701) or the V.35 Interface (#1550), the corresponding host interface feature(s), and a connecting cable. Shown below are the hosts that provide direct connection attachment for the 3274. Only the basic features needed by the 3274 direct connect hosts are listed. These features may have prerequisites, therefore the machine pages for those hosts should also be reviewed. Physical planning manuals for the respective direct connect hosts can provide additional information on the connecting cables.

### MODELS 21C AND 31C

Unit	Speed	Host	B	S
Attach	(bps)	Feature	S	D
		Number	C	C
3705-1, 2, 80				
	14.4K, 57.6K	#4727 (1W)	-	x
	14.4K, 57.6K	#4728 (1Z)	-	x
3705-80				
	14.4K, 57.6K	#6715 (LS5)	-	x
3720-1, 2, 11, 12, 3721-1, 2				
	2400	#4911	x	x
	4800	#4911	x	x
	9600	#4911	x	x
	19200	#4911	x	x
	19200	#4931	x	x
	38400	#4931	x	x
	55885	#4931	x	x
	2400	#4941	-	x
	4800	#4941	-	x
	9600	#4941	-	x
	19200	#4942	-	x
	38400	#4942	-	x
	55885	#4942	-	x
3725-1, 2, 3726				
	2400	#4911	x	x
	4800	#4911	x	x
	9600	#4911	x	x
	19200	#4911	x	x
	19200	#4931	x	x
	56000	#4931	x	x
	2400	#4941	-	x
	4800	#4941	-	x
	9600	#4941	-	x

## MACHINES

19200	#4942	-	x
56000	#4942	-	x
4331 Mdl Grp 1 and 2			
2400	#4801	x	x
4800	#4801	x	x
9600	#4801	x	x

Unit Attach	Maximum Cable Length	3274 Feature Number	
3705-1,	2, 80		
	57m (190')	#1550, #6303	
	57m (190')	#1550, #6303	
3705-80			
	60m (200')	#1550, #6303	
3720-1,	2, 11, 12,	3721-1, 2	
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302 or #6303	
	35m (115')	#3701, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#5656, #6302	
	150m (492')	#5656, #6302	
	150m (492')	#5656, #6302 or #6303	
	150m (492')	#5656, #6303	
	150m (492')	#5656, #6303	
	150m (492')	#5656, #6303	
3725-1,	2, 3726		
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302 or #6303	
	35m (115')	#3701, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#5656, #6302	
	150m (492')	#5656, #6302	
	150m (492')	#5656, #6302 or #6303	
	150m (492')	#5656, #6303	
	150m (492')	#5656, #6303	
4331 Mdl Grp 1, 2			
	400m (1,312')	#3701, #6302	
	200m (656')	#3701, #6302	
	100m (328')	#3701, #6302 or #6303	

## MODEL 51C

Unit Attach	Speed (bps)	Host Feature Number	B	S	D	L	C
3704							
	1200	#4716 (1F)	x				x
3705-1,	2, 80						
	1200	#4716 (1F)	x				x
	14.4K,57.6K	#4727 (1W)	-				x
	14.4K,57.6K	#4728 (1Z)	-				x
3705-80							
	14.4K,57.6K	#6715 (LS5)	-				x
3720-1,	2, 11, 12,	3721-1, 2					
	2400	#4911	x				x
	4800	#4911	x				x
	9600	#4911	x				x
	19200	#4911	x				x

19200	#4931	x	x
38400	#4931	x	x
55885	#4931	x	x
2400	#4941	-	x
4800	#4941	-	x
9600	#4941	-	x
19200	#4942	-	x
38400	#4942	-	x
55885	#4942	-	x
3725-1, 2, 3726			
2400	#4911	x	x
4800	#4911	x	x
9600	#4911	x	x
19200	#4911	x	x
19200	#4931	x	x
56000	#4931	x	x
2400	#4941	-	x
4800	#4941	-	x
9600	#4941	-	x
19200	#4942	-	x
56000	#4942	-	x
4331 Mdl Grp 1 and 2			
1200	#4801	x	x
2400	#4801	x	x
4800	#4801	x	x
9600	#4801	x	x
8101/8130/8140			
1200,2400	#3701 (FAC 15)	-	x
4800,9600	#3701 (FAC 16)	-	x
1200,2400	#1550 (FAC 24)	-	x
4800,9600	#1550 (FAC 25)	-	x
8101/8140 BXX			
56K	#1550 (FAC 26)	-	x
8140 CXX			
4800	#1621	-	x
56K	#1614	-	x

Unit Attach	Max Cable Length	3274 Feature Number	
3704			
	30m (100')	#3701, #6301	
3705-1,	2, 80		
	30m (100')	#3701, #6301	
	57m (190')	#1550, #6303	
	57m (190')	#1550, #6303	
3705-80			
	60m (200')	#1550, 6303	
3720-1,	2, 11, 12,	3721-1, 2	
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302 or #6303	
	35m (115')	#3701, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#1550, #6303	
	150m (492')	#5656, #6302	
	150m (492')	#5656, #6302	
	150m (492')	#5656, #6302 or #6303	
	150m (492')	#5656, #6303	
	150m (492')	#5656, #6303	
	150m (492')	#5656, #6303	
3725-1,	2, 3726		
	35m (115')	#3701, #6302	
	35m (115')	#3701, #6302	

## MACHINES

35m (115')	#3701, #6302 or #6303
35m (115')	#3701, #6303
150m (492')	#1550, #6303
150m (492')	#1550, #6303
150m (492')	#5656, #6302
150m (492')	#5656, #6302
150m (492')	#5656, #6302 or #6303
150m (492')	#5656, #6303
150m (492')	#5656, #6303
4331 Mdl Grp 1 and 2	
800m (2,625')	#3701, #6302
400m (1,312')	#3701, #6302
200m (656')	#3701, #6302
100m (328')	#3701, #6302 or 6303
8101/8130/8140	
12m (40')	#3701, #6302
12m (40')	#3701, #6302
300m (1,000')	#1550, #6302
300m (1,000')	#1550, #6302
8101/8140 BXX	
300m (1,000')	#1550, #6303
8140 CXX	
13m (40')	#3701, #6302
56K 300m (1,000')	#1550, #6303

**Communications Adapters (Mdl 21C, 31C, 51C):** Communications adapters handle the transmission control protocols (SDLC and BSC). One, and only one can be selected, but one is required on each 21C, 31C or 51C.

**Communications Interfaces (Mdl 21C, 31C, and 51C):** Communications interfaces connect a mdl 21C, 31C or 51C to the host link. One and only one can be selected, but one is required.

**Problem Determination Procedure:** Significant function has been designed into these units to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

The Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing communication network problem determination/isolation and enhances the availability and serviceability of the 3274 for the above environments in both BSC and SDLC attachment modes. See NPDA in the Program Products section.

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation, enhances the availability and serviceability of the 3274 in BSC mode. See DEMF in the SCP sections for OS/VS1 and OS/VS2.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
3. Contact CE to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
4. Notify IBM of intent to relocate and follow IBM instructions for relocation.
5. Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
6. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

7. Receipt at the customer's receiving dock, unpacking, and placement of the 3274.
8. Contacting IBM CE to accomplish the channel connection tasks for the 3274 mdls 21A, 21B, 21D, 31A or 31D.
9. Connection of communication cable to the communications facility for the 3274 mdl 21C or 31C or 51C.
10. Procurement, installation, and maintenance of the loop network when applicable on a 3274 mdl 51C.
11. Performing 3274 customization in accordance with IBM-supplied procedures:
  - For initial installation.
  - When made necessary by changes in configuration.
  - For updating of the control unit diskettes (at customer option).
  - When initializing and updating the keyboard tables using the Keyboard Definition Utility.

**Bibliography:** See "KWIC Index", G320-1621, or applicable system bibliography:

GC20-0360 S/360  
GC20-0001 S/370  
GC20-0001 4300  
GC20-8100 8100

**Note:** Use the HONE configurator (CF3270) to assist in configuring the 3274 before entering an order.

## BASIC CONFIGURATION

Specify codes are not normally required to order a 3274. The 3-digit country code entered on the DP machines order sheet will be used to select the country variables (power, power cable plug, machine nomenclature) based on the specification most commonly used in that country. If codes are not specified otherwise, the machines are shipped as follows:

- Power (AC, 1-phase):
  - Argentina 220V/50 Hz
  - Australia 240V/50 Hz
  - Brazil 110V/60 Hz
  - Canada 120V/60 Hz (mdls 21C,31C,51C)
  - Canada 208V/60 Hz (mdls 21A,21B,21D,31A,31D)
  - Chile 220V/50 Hz
  - Mexico 120V/60 Hz
  - New Zealand 230V/50 Hz
  - Venezuela 120V/60 Hz
  - All others (Must Specify desired power)
- Power Cable Length: 4.3m (14 ft).
- Power Cable Plug (except Canada and Japan): The 3-digit country code of the DPMO is used to select a power plug which matches the most commonly-used power supply in that country.
- Power Cable Plug (Japan only): Locking plug for voltages under 200V.
- Power Cable Plug (Canada only): Non-locking.
- Communications Cable Length: (Mdl 21C, 31C, 51C) 6.1m (20 ft).

## CONFIGURATION SUPPORT

- Configuration Support A: #9110
  - Nomenclature: The following defaults are assumed:
    - Argentina - Spanish Speaking
    - Brazil - Brazilian
    - Canada - English

Japan - English  
Mexico - Spanish Speaking  
Venezuela - Spanish Speaking  
All others - English

## SPECIFY

The Specify section can be ignored unless the options provided in the "Basic Configuration" above do not meet your needs.

- **Mandatory Specify:** #2998 - AG-A/PG Country.
- **Power (AC, 1-phase):** If power different than the one provided by "Basic Configuration" default is required, specify one of the following (not all voltages apply to all countries):

(Except Canada>	
50 Hz	60 Hz
100V #2804	100V #2703
110V #2805	110V #2822
200V #2806	120V #2800*
220V #2813	127V #2823
230V #2821	200V #2732
240V #2801	208V #9902
	220V #2803
	240V #2831**

\* Includes requirements for 115V  
\*\* Includes requirements for 230V <)

(Canada only>	
Mdl	120V 208V 240V
21A,B,D; 31A,D	N/A D(1) #2831(1)
21C,31C	D #9902 #2831
51C	D N/A N/A

(1) = For Waterproof Connector, see "Special Features".  
D = Default Option  
N/A = Not Available <)

- For Japan only, specify #9891 for non-locking plug for voltages under 200V.
- For Canada only, specify #9890 for locking plug.
- For countries except Canada and Japan, the country code of the DPMO is used to select a power plug which matches the most commonly-used power supply in that country. If an exception to the above is required, a country RPQ may be initiated. For details concerning power plugs, refer to "IBM Information Display System Installation Manual - Physical Planning", (GA27-2787).

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

- **Machine Nomenclature:**

Brazilian	#2933
Canadian French	#2935
English UK	#2927
English US	#2924
Japanese	#2930
Spanish Speaking	#2931

- **Communication Cable:** A 6.1m (20 ft) communication cable is provided as standard with each Communications Interface feature except the Loop Adapter #4850. If the standard 6.1m (20 ft) communication cable is not desired, specify one of the following: #9061 for 3.0m (10 ft), #9062 for 9.1m (30 ft) or #9063 for 12.2m (40 ft) cable.

A 1.8m (6 ft) communication cable (Loop Station Connector (LSC) cable) is provided as standard for mdl 51C attachment

to a direct-attached or data link-attached loop. If standard cable is not desired, specify #9405 for 4.3m (14 ft) cable.

- **Configuration Support:** The Configuration support required for the 3274 must be determined before ordering special features or attaching certain terminals. Refer to the "3274 Control Storage Requirements Tables" for a detailed listing of the functions supported by each option. Field Installation: Yes. (Configuration Support D #9124 is field installation only for mdls 31A, 31C and 31D.) Customer Setup: Yes. Limitations: Certain functions require host software support in order to be utilized. Refer to host programming support descriptions to determine the levels of software required.

**Note:** When operating a large screen (screen size greater than 1,920 characters) display station that is connected to a 3274 mdl 21B, 21C, 31C, 21D, 31D or 51C in a VM/370 environment, an RPQ is recommended to change the function of the display keyboard Clear key so that it will not place the display in default mode. See RPQ 8K0976, 8K0977, or 8K0978.

- **Configuration Support A (#9110):** This Configuration Support is the default option and is shipped with all 3274s unless (Canada only> Diskette Distribution Alternative RPQ (8K1072), <) Configuration Support C (#9112), D (#9124) or Configuration Support P (#9116) is specified. It need not be specified unless it is being ordered to replace Configuration Support B (no longer available), C or D (#9111, #9112 OR #9124 respectively) in the field. It provides support for all 3270 functions listed in Table 1, plus support for solicitation of summary maintenance statistics from a 3274 mdl 21A, 31A, 21C/SNA, 31C/SNA, 51C/SNA through the use of Network Problem Determination Application (NPDA), and support for base color on attached terminals. It also supports the X.21 Adapter for Nonswitched Networks and 3270 Personal Computer (Control Unit Terminal Mode).

- **Configuration Support B (#9111) (Mdls 21A, 21C, 31A, 31C, 31D, 51C):** Provides support for all 3270 functions included in Configuration Support A (#9110) plus the ability to attach 3278 mdl 5s or a 3180 mdl 1 emulating a mdl 5 and support for the following functions:

- Pacing of inbound message traffic (mdls 21A, 21C/SNA, 31A, 31C/SNA and 51C/SNA).
- Automatic Session recovery in both single and multi-domain networks (mdl 21C/SNA, 31C, and 51C/SNA).
- Host notification of changes in the power on/off status at attached terminals (mdls 21A, 21C/SNA, 31A, 31C, and 51C/SNA).

- **Configuration Support C (#9112) (Mdls 31A, 31C, 31D, 51C):** Provides support for all 3270 functions included in Configuration Support A, plus support for the following additional functions:

- Ability to attach 3278 mdl 5s or a 3180 mdl 1 emulating a mdl 5.
- Pacing of inbound message traffic (mdls 31A, 31C/SNA, and 51C/SNA).
- Host notification of changes in the power on/off status at attached terminals (mdls 21A, 21C/SNA, 31A, 31C/SNA, and 51C/SNA).
- Structured Field and Attribute Processing (SFAP).
- Programmed Symbols (PS) on attached terminals.
- Extended Color on attached terminals.
- Extended Highlighting on attached terminals.
- Decompression of PS Load Data.
- BSC Text Blocking.
- BSC Transparency.
- Integrated Modems.
- X.21 Switched Network Operation (SNA/SDLC mdl 51C only).
- 3274 Entry Assist RPQ.
- 4250 Attachment.
- Alert Function (mdls 31A, 31C/SNA, 51C/SNA).
- Response Time Monitor (mdls 31A, 31C, 31D, 51C).

Notes:

1. The APL/Text Control Function, which is a separate option in Configuration Support A, is included as a basic function of Configuration Support C.
  2. Configuration Support C, unlike Configuration Support A or B, generates a program check (X PROG 470) whenever an EBCDIC data stream contains a device control code(s) that the 3274 does not support. To prevent the program check, users must purge the unsupported code(s) from the data stream.
- Configuration Support D (#9124): (Mdl 31A, 31C, 31D, 51C) Provides support for all 3270 functions included in Configuration Support C plus support for:
    - 3191 Display Station
    - 3192 Display Station
    - 3290 Information Panels Displays
    - 3274 Entry Assist on 3178/3179/3180/3191/3192/3278/3279/3290 Displays
    - The Keyboard Definition Utility for 3179/3180 mdl 1/3191/3192
    - 3180 mdl 1 scrolling support
    - 3179 and 3180 mdl 1 display stations in extended function (native) mode
    - X.25 data transmission services (mdl 31C, 51C with 256K)
    - 3179 mdl G Color Graphics Display Station
    - 3192 mdl G Color Graphics Display Station
    - Intelligent Printer Data Stream (IPDS) Support (release level 65 required)
- Limitations: 1) When 3290s, 3179-Gs and/or 3192-Gs are attached, specify #9301 or #9305 is required to get a microcode load diskette that must be used with Configuration Support D to enable the downstream load of 3290s, 3179-Gs and/or 3192-Gs with operational microcode. See "3290/3179-G/3192-G Support" under "Specify". In addition, a utility diskette is also provided with #9301 and #9305 to enable the customizing of the 3290, 3179-G and 3192-G keyboard and keypad layouts. However the utility diskette provided with the #9305 (Katakana) load diskette is only applicable to the 3179-G and 3192-G. The 3290 Katakana keyboard and keypad layouts cannot be customized. 3193s cannot be attached to the same 3274 Control Unit. 2) When 3193s, 3179-Gs and/or 3192-Gs are attached, specify (Except Katakana, #9311) (Katakana only, #9315) which is required to get a microcode load diskette that must be used with Configuration Support D, release 65 or higher to enable the downstream loading of 3193s, 3179-Gs and/or 3192-Gs with operational microcode. See "3193/3179-G/3192-G Support" under Specify. 3290s cannot be attached to the same 3274 Control Unit. 3) Configuration Support D will NOT support Category B Terminals (i.e., IBM PC/XT370 with 3277 emulation card) in any combination with 3290s, 3270 PCs (Distribution Function Mode), 3179-Gs, 3192-Gs or 3193s. Prerequisites: #3650. For X.25 support, 256K of control storage is required (two #3650s are required). Specify: #9124 for Configuration Support D.
- Configuration Support P (#9116): (Mdl 31C, 51C) This Configuration Support provides functions equivalent to Configuration Support A, but is for X.25 operation only. Prerequisites: (1) #6303. (2) Mdl 51C (128K of control storage), #1800, or #1802 and #3632, or #1802, #3630, and #3631.
  - 3193/3179-G/3192-G Support: This support is specify code (Except Katakana, #9311) (Katakana only, #9315). One of these must be specified to get 3193/3179-G/3192-G microcode load diskettes which must be used with Configuration Support D, release 65 or higher to enable the downstream loading of 3193s, 3179-Gs and/or 3192-Gs with operational microcode. In addition, a utility diskette is also provided with #9311 and #9315 (Katakana 3179-G/3192-G only) to enable the customizing of the 3193, 3179-G and 3192-G keyboard and keypad layouts. Field Installation: Yes. Customer Setup: Yes. Limitations: 3290s cannot be attached to the same 3274 Control Unit.
  - 3290/3179-G/3192-G Support: (Mdl 31A, 31C, 31D, 51C) This support is specify code #9301 or #9305. When 3290s, 3179-Gs

and/or 3192-Gs are attached and Configuration Support D is to be used, one of these must be specified to get a microcode load diskette which must be used with Configuration Support D to enable the downstream loading of 3290s, 3179-Gs and/or 3192-Gs with operational microcode.

In addition, a utility diskette is also provided with #9301 and #9305 (Katakana) to enable the customizing of the 3290, 3179-G and 3192-G keyboard and keypad layouts. However, the utility diskette provided with the #9305 (Katakana) load diskette is only applicable to the 3179-G and 3192-G. The 3290 Katakana keyboard and keypad layouts cannot be customized. Field Installation: Yes. Customer Setup: Yes. Prerequisites: #9124. Specify: #9301 for all languages except Katakana. For Katakana, specify #9305.

**Note:** Load diskettes originally contained only microcode for the 3290. The 3179-G/3192-G microcode was added. Refer to the diskette label to determine the release level and the load microcode that is actually contained on a particular diskette. Original load diskettes will only support the 3290 and the labels on these diskettes only makes reference to the 3290.

## CONTROL STORAGE REQUIREMENT TABLES

(Mdl 21A, 21C, 21D, 51C)

After the desired "Special Features" have been selected, the control storage requirement must be determined by using the appropriate table below. Some combinations of functions and features may exceed the capacity of the control storage in the mdls 21A, 21C, 21D, and 51C without EFS. If the sum of the storage requirements is greater than 65,536, a mdl 31 or 51C with EFS Control Unit is required. The mdl 31s and 51C with EFS can run any combination of functions and features, except as noted under the "Special Consideration - Mdl 31A, 31C, and 51C/EFS" that follows after the tables.

1. Refer to the appropriate part of Table 1 and select the features desired:
  - 3274 mdl 21A, refer to Table 1, Part 1
  - 3274 mdl 21C/or 51C w/o EFS SNA, refer to Table 1, Part 2
  - 3274 mdl 21C/or 51C w/o EFS BSC, refer to Table 1, Part 3
  - 3274 mdl 21D, refer to Table 1, Part 4
2. Determine the total storage requirements for the features selected in Step #1.
3. If the total storage requirement calculated in Step #2 is equal to or less than 65,536, the mdl 21 or 51C without EFS can be used. However, if step #2 storage requirement is greater than 65,536, the mdl 21 Control Unit or mdl 51C without EFS cannot be used and a mdl 31 Control Unit or mdl 51C with EFS is required.

### Notes for Table 1 - Parts 1, 2, 3, 4

1. Configuration Support A Consideration Only: If all three keyboard types (Typewriter, Data Entry, and Date Entry/Keypunch-like) are required on display stations attached to the 3274, add 1,000 to the storage requirements in addition to those listed in the table.
2. There is no customizing option nor additional control storage required to support 10 Numeric-only Character Set for Operator Identification Card Reader (#4600) on 3277s (Category B terminals) which are attached to a 3274.
3. If the total storage requirement calculated for Category A plus Category B Terminals exceeds the applicable maximum storage value below, use the applicable maximum storage:
 

Unit	Maximum Storage Value
3274 mdl 21C/BSC	11,544
3274 mdl 21D	13,144
4. Add the indicated amount for each keyboard type to be used.
5. A 6580 requires two terminal ports when it includes a printer.

TABLE 1 - PART 1

	Stg Reqt
3274 Model 21A	
Mdl 21A (including copy)	
Configuration Support A (#9110)	54,800
Category A terminals (Choose one)(5)	
1 to 8 terminals (incl. in base)	0
1 to 16 terminals	2,048
1 to 24 terminals	4,096
1 to 32 terminals	6,144
Keyboards on Category A terminals (select all that apply, choosing at least one)(4)	
Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4627, 3178 mdl C2)	786
3191 Display Station	786
3192 Display Station	786
3270 Personal Computer Control Unit Terminal Mode	786
5160 mdl 589 (XT/370)	
5170 mdl 599 (AT/370)	
Typewriter(1) (3178 mdl C3)	786
Typewriter(1) (3178 mdl C4)	786
Data Entry (3180 mdl 1-#4601)	786
Data Entry(1) (3278/3279-#4622, 3178 mdl C1)	786
Data Entry KP(1) (3278/3279-#4623)	786
APL (3180 mdl 130, 3278/3279- #4626)	1,560
Canadian French keyboards (any)	650
Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4624,#4627,#4628)	1,042
Data Entry(1) (3278/3279-#4622)	1,042
Data Entry KP(1) (3278/3279- #4623)	1,042
Data Entry (3180 mdl 1-#4601)	1,042
APL (3180 mdl 130, 3278/3279- #4626)	1,816
Japanese Katakana Keyboards	
Typewriter (3278/3279-#2715, #2717, 3178 mdl C2)	1,304
Data Entry (3278/3279-#2716, 3178 mdl C1)	1,304
Data Entry (3180-#4601)	1,304
APL (3180 mdl 130, 3278/3279- #2718)	2,072
APL/Text Control Function	2,900
3289 Text Print Control	512
Host-Loadable Printer Authorization Matrix	500
Between Bracket Printer Sharing	900
SCS Printer Support (3287-#9660) (3262, 3268, 3289, 4224, 4234, 4245, and 5210-basic function)	1,700
Magnetic Reader Control (3278/3279- #4999) (Choose one)	
3275/3277 Like 10-Character Set	660
Numeric and Alphameric Char. Sets	1,946
3279 Color Convergence	5,494

TABLE 1 - PART 2

	Stg Reqt
3274 Model 21C/SNA or 51C/SNA	
Mdl 21C/SNA or 51C/SNA (incl copy)	

Configuration Support A (#9110)	54,730
Category A Terminals (Choose one)	
(mdl 21C only)(5)	
1 to 8 terminals (included in base)	0
1 to 16 terminals	2,048
1 to 24 terminals	4,096
1 to 32 terminals	6,144
Keyboards for Category A terminals (select all that apply, choosing at least one)(4)	
Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4627, #4628, 3178 mdl C2)	786
3191 Display Station	786
3192 Display Station	786
3270 PC Control Unit Terminal Mode	786
5160 mdl 589 (XT/370)	
5170 mdl 599 (AT/370)	
Typewriter(1) (3178 mdl C3)	786
Typewriter(1) (3178 mdl C4)	786
Data Entry(1) (3278/3279-#4622, 3178 mdl C1)	786
Data Entry KP(1) (3278/3279-#4623)	786
Data Entry(1) (3180 mdl 1-#4601)	786
APL (3180 mdl 130, 3278/3279- #4626)	1,560
Canadian French Keyboards (any)	650
Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4624,#4627,#4628)	1,042
Data Entry (1) (3278/3279-#4622)	1,042
Data Entry (1) (3180 mdl 1-#4601)	1,042
Data Entry KP(1) (3278/3279- #4623)	1,042
APL (3180 mdl 130, 3278/3279- #4626)	1,816
Japanese Katakana Keyboards	
Typewriter (3278/3279-#2715, #2717, 3178 mdl C2)	1,304
Data Entry (3278/3279-#2716, 3178 mdl C1)	1,304
Data Entry (3180 mdl 1-#4601)	1,304
APL (3180 mdl 130, 3278/3279- #2718,#2721)	2,072
APL/Text Control Function	2,900
3289 Text Print Control	512
High-Performance Communications Adapter (#6303)	100
Host-Loadable Printer Authorization Matrix	500
Between Bracket Printer Sharing	900
SCS Printer Support (3287-#9660) (3262, 3268, 3289, 4224, 4234, 4245, and 5210-basic function)	1,700
Magnetic Reader Control (3278/ 3279-#4999) (Choose one)	
3275/3277 Like 10-Character Set	660
Numeric and Alphameric Character Sets	1,946
Encrypt/Decrypt (#3680)	5,200
3279 Color Convergence	5,494

TABLE 1 - PART 3

	Stg Reqt
3274 Model 21C/BSC or 51C/BSC	
Configuration Support A (#9110)	51,800
Category A Terminals (Choose one)(3)	
(mdl 21C only)(5)	
1 to 8 terminals (incl. in base)	0

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1 to 16 terminals	2,048	1 to 24 terminals	4,096
1 to 24 terminals	4,096	1 to 32 terminals	6,144
1 to 32 terminals	6,144	Keyboards on Category A terminals (select all that apply, choosing at least one)(4)	
Keyboards on Category A terminals (select all that apply, choosing at least one)(4)		Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4624, #4627, #4628, 3178 mdl C2)	786
Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4624, #4627, #4628, 3178 mdl C2)	786	3191 Display Station	786
3191 Display Station	786	3192 Display Station	786
3192 Display Station	786	3270 Personal Computer Control Unit Terminal Mode	786
3270 Personal Computer Control Unit Terminal Mode	786	5160 mdl 589 (XT/370)	
5160 mdl 589 (XT/370)		5170 mdl 599 (AT/370)	
5170 mdl 599 (AT/370)		Typewriter(1) (3178 mdl C3)	786
Typewriter(1) (3178 mdl C3)	786	Typewriter(1) (3178 mdl C4)	786
Typewriter(1) (3178 mdl C4)	786	Data Entry(1) (3278/3279-#4622, 3178 mdl C1)	786
Data Entry(1) (3278/3279-#4622, 3178 mdl C1)	786	Data Entry KP(1) (3278/3279-#4623)	786
Data Entry KP(1) (3278/3279-#4623)	786	Data Entry(1) (3180 mdl 1-#4601)	786
Data Entry(1) (3180 mdl 1-#4601)	786	APL (3180 mdl 130, 3278/3279- #4626)	1,560
APL (3180 mdl 130, 3278/3279- #4626)	1,560	Canadian French keyboards (any)	650
Canadian French keyboards (any)	650	Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4624, #4627, #4628)	1,042
Typewriter(1) (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#4621, #4624, #4627, #4628)	1,042	Data Entry(1) (3278/3279-#4622)	1,042
Data Entry(1) (3278/3279-#4622)	1,042	Data Entry KP(1) (3278/3279-#4623)	1,042
Data Entry KP(1) (3278/3279- #4623)	1,042	Data Entry(1) (3180 mdl 1-#4601)	1,042
Data Entry(1) (3180 mdl 1-#4601)	1,042	APL (3180 mdl 130, 3278/3279- #4626)	1,816
APL (3180 mdl 130, 3278/3279- #4626)	1,816	Japanese Katakana Keyboards	
Japanese Katakana Keyboards		Typewriter (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#2715, #2717, 3178 mdl C2)	1,304
Typewriter (3179 mdl 1, 3180 mdl 1-#4600, 3278/3279-#2715, #2727, 3178 mdl C2)	1,304	Data Entry (3278/3279-#2716, 3178 mdl C1)	1,304
Data Entry (3278/3279-#2716, 3178 mdl C1)	1,304	Data Entry (3180 mdl 1-#4601)	1,304
Data Entry (3180 mdl 1-#4601)	1,304	APL (3180 mdl 130, 3278/3279- #2718)	2,072
APL (3180 mdl 130, 3278/3279- #2718)	2,072	Category B terminals (Choose one) (2,3)	
Category B terminals (Choose one) (2,3)		1 to 4 terminals	8,024
1 to 4 terminals	6,424	1 to 8 terminals	9,048
1 to 8 terminals (mdl 21C)	7,448	1 to 12 terminals	10,072
1 to 12 terminals (mdl 21C)	8,472	1 to 16 terminals	11,096
1 to 16 terminals (mdl 21C)	9,496	APL/Text Control Function	6,300
APL/Text Control Function	6,900	Copy (Print Key Function)	2,700
3289 Text Print Control	512	3289 Text Print Control	512
Host-Loadable Printer Authorization Matrix	550	Host-Loadable Printer Authorization Matrix	550
Copy (Print Key Function)	2,700	Magnetic Reader Control (3278/3279- #4999) (Choose one)	
Magnetic Reader Control (3278/ 3279-#4999) (Choose one)	660	3275/3277 Like 10-Character Set Numeric & Alphameric Character Sets (mdl 21C)	1,436
3275/3277 Like 10-Character Set Numeric & Alphameric Character Sets (mdl 21C)	1,436	Numeric & Alphameric Character Sets (mdl 51C)	1,946
Numeric & Alphameric Character Sets (mdl 51C)	1,946	3279 Color Convergence	5,494
3279 Color Convergence	5,494		

TABLE 1 - PART 4

3274 Model 21D	Stg Reqts
Configuration Support A (#9110)	51,500
Category A terminals (Choose one)(3,5)	
1 to 8 terminals (included in base)	0
1 to 16 terminals	2,048

(Except Canada > Special Consideration - Mdl 31A, 31C, 51C/EFS  
(SNA/SDLC): When using Configuration Support C (#9112) for use  
on either a mdl 31A or a mdl 31C or 51C with EFS (SNA/SDLC), it is  
necessary to ensure that the desired combination of features and  
functions forms a valid configuration.<)

(Canada only > Special Consideration - Mdl 31A, 31C, 51C/EFS:  
When using Configuration Support C (#9112) on a mdl 31A, 31C or a  
51C with EFS, it is necessary to ensure that the desired combination  
of features and functions forms a valid configuration.<)

### Notes for Table 2 - Parts 1, 2, 3

1. Refer to the appropriate table of control storage requirements,  
and select the desired features and functions  
a. For 3274 mdl 31A, use Table 2, Part 1.

- b. For 3274 mdl 31C or 51C with EFS using SNA protocol, use Table 2, Part 2.
- c. (Canada only) For 3274 mdl 31C or 51C with EFS using BSC protocol, use Table 2, Part 3.
2. Determine the total storage requirements for the features and functions selected in step 1.
3. If the total storage requirement exceeds 71,680, one or more features must be forfeited in order to reduce the control storage requirements to 71,680 or less.
4. SCS printer support is required for DCA-LV2 word processing applications. This support also required for 5210 mdls G01, G02 attached to 3274 mdls 31A, 31C SNA, and 51C SNA for applications that utilize the Cut Sheet Feed Attachment (#7860), when operating with two drawers.
5. Configuration Support C #9112 is required for 5210 mdls G01, G02 attached to 3274 mdls 31A, 31C SNA, and 51C SNA for support of word processing applications. This includes those applications which utilize the Cut Sheet Feed Attachment (#7860), when operating with two drawers.

TABLE 2 - PART 1

3274 Model 31A	Stg Reqts
Configuration Support C	50,030
Category B Terminals	4,900
Host-Loadable Printer	
Authorization Matrix	500
Between Bracket Printer Sharing	800
SCS Printer Support (3287 - #9660/#9661)(Note 1)	
(3262, 3268,	
4224, 4234 and 4245	
- basic function)(Note 2)	
(3289 - basic function) (5210 mdl	
G1, G2 basic function - #4, #5)	
(4245 mdls D12 and D20 (supported	
as a 3262 mdl 3)) (4250 - basic	
function)(Note 3)	1,600
Magnetic Reader Control (3278/ 3279-#4999), choose one:	
3275/3277 like 10 Character Set	600
Numeric/Alphameric Char. Sets	1,630
Color Convergence (base or extended color)	4,296
Structured Field and Attribute Processing (SFAP) (Required for Extended Color, Extended High- lighting, Programmed Symbols, and the Query Function	4,950
Programmed Symbols (PS)	2,700
Decompression of PS Load Data	900
Alert Function	2,544
Response Time Monitor	4,488
(Canada only)	
IBM Personal Computer Attachment Support (3278/3279-#5315, #5316/ #5325, #5326)	3,200
<)	
Any Canadian French Keyboard	500

Notes:

1. The SFAP function is also required when the SCS Support for SFAP (#9661) feature is to be used on 3287 mdls 1, 2, 1C or 2C.
2. The SFAP function is also required when the Query function is used with 3262 mdls 3 and 13, 3268 mdl 2, 4224 mdl 201, 202, 2E2, or 2C2, 4234 mdl 1 and 4245 mdls D12 and D20. The Query function allows the application to interrogate the printer to determine what function is supported.
3. For 4250 attachment to 3274 mdl 31A, the SFAP function is also required.

TABLE 2 - PART 2

3274 Model 31C/SNA	Stg Reqts
3274 Model 51C/EFS/SNA	
Configuration Support C	50,580
Category B Terminals	4,900
Host-Loadable Printer	
Authorization Matrix	500
Between Bracket Printer Sharing	800
SCS Printer Support (3287 - #9660/ #9661)(Note 1)	
(3262, 3268,	
4224, 4234 and 4245	
- basic function)(Note 3)	
(3289 - basic	
function) (5210 - basic function	
- #4, #5)	1,600
Mag Rdr Control (3278/3279- #4999), choose one:	
3275/3277-like 10-Character Sets	600
Num & Alpha Character Sets	1,630
Encrypt/Decrypt (#3680)	3,200
Color Convergence (base or extended color)	4,296
Structured Field and Attribute Processing (SFAP)	
(EBCDIC only) (Required for Extended Color, Extended High- lighting, Programmed Symbols, and the Query Function)	4,950
Programmed Symbols (PS)	2,700
Decompression of PS Load Data	900
Alert Function	2,544
Response Time Monitor	4,488
High-Performance Communications Adapter (#6303)	600
(Canada only)	
IBM Personal Computer Attachment Support (3278/3279-#5315, #5316/ #5325, #5326)	3,200
<)	
Any Canadian French Keyboard	500
X.21 Switched Network Operation (Mdl 51C)	6,500
Loop Attachment (EBCDIC only, mdl 51C)	3,200

1. The SFAP function is also required when the SCS support for SFAP (#9661) feature is to be used on 3287 mdls 1, 2, 1C or 2C.
2. Ignore this note.
3. The SFAP function is also required when the Query Function is used with 3262 mdls 3 and 13, 3268 mdl 2s, 4224 mdl 201, 202, 2E2, or 2C2, 4234 mdl 1 and 4245 mdls D12 and D20. The Query Function allows the application to interrogate the printer to determine what functions are supported.

(CANADA ONLY) TABLE 2 - PART 3

3274 Model 31C/BSC	Stg Reqts
3274 Model 51C/EFS/BSC	
Configuration Support C	47,150
Category B terminals	4,700
Host-Loadable Printer	
Authorization Matrix	550
Copy (Print Key Function)	2,700
Magnetic Reader Control (3278- #4999) (Choose one)	
3275/3277-like 10-character set	600
Numeric & Alphameric Char. Set	1,630
Color Convergence (Base or	

Extended Color)	4,296
Structured Field and Attribute Processing (SFAP) (EBCDIC only)	4,950
Programmed Symbols (PS)	2,700
Decompression	900
Response Time Monitor	2,016
IBM Personal Computer Attachment Support (3278/3279-#5315, #5316/#5325, #5326)	3,200
Any Canadian French Keyboard	500
<)	

(Canada only> An alternative to feature #9011 is RPQ 8K1071 and RPQ 8K1072. The purpose of these RPQs is to assist the customer with network management by providing new procedures for altering, rapid copying, and means for sending customized 3274 System Diskettes between a customer's central site location and his remote locations. For a full description of these RPQs, refer to the RPQ Description and Price Transmittal. see IBM. <)

## SPECIAL FEATURES

### NON-COMMUNICATIONS FEATURES

**Integrated Diskette Drive Enhancement (#3101):** (Mdl 31A, 31C, 31D) Installs the enhanced file that is required to use Configuration Support D. Field Installation: Yes. Field Installation only. All parts removed from purchased machines remain customer property.

**Encrypt/Decrypt (#3680):** (Mdl 21C, 31C, 51C (SDLC)) Provides the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt feature (#6010, 5735-RC2) or ACF/TCAM, Version 2 (5735-RC3) and either the 3848 and the OS/VS1 and OS/VS2 MVS Cryptographic Unit Support Program Product (5740-XY6), or the OS/VS1 and OS/VS2 MVS Programmed Cryptographic Facility Program Product (5740-XY5), data transmitted over unprotected communications lines can be safeguarded through cryptography. Limitations: (1) SNA/SDLC only. (2) Cannot be installed with #4850 on mdl 51C. (3) Encrypted data streams cannot be sent to a 3290 or 3270 Personal Computer (Distributed Function Mode). (4) Mutually exclusive with X.25. The cryptographic feature cannot be used with X.25 operation. Maximum: One. Field Installation: Yes. Note: A mercury battery, P/N 1743456, or equivalent, is needed. A battery is shipped with this feature. See "Accessories" for an additional or replacement battery. Replacement of a discharged battery is the customer's responsibility. The discharged IBM battery should be returned to IBM.

**Integrated Diskette Drive Enhancement (#5101):** (Mdl 51C) Installs the enhanced file that is required to use Configuration Support D. Field Installation: Yes. Field Installation only. All parts removed from purchased machines remain customer property.

**Power Expansion (#5550):** (Mdl 51C) Provides the additional power required for #7801 or the 2400, 4800 and 9600 bps Integrated Modem features (#5640, #5740, #5840, #5842). Maximum: One. Field Installation: Yes.

**Response Time Monitor (#6101):** (Mdl 31A, 31C, 31D, 51C) Provides the capability for enhanced network management by measuring response times. The Response Time Monitor feature accurately measures and records the transaction time between an inbound host attention (AID) and a user-defined transaction end. Maximum: One. Field Installation: Yes. Prerequisites: Configuration Support C #9112 release level 47 and above or Configuration Support D #9124 release level 61 and above.

(Canada only> **Waterproof Power Connector (#8801):** (Mdl 21A, 21B, 21D, 31A, 31D) Provides a special waterproof connector instead of the normal locking or non-locking plugs on the power cable. This connector is sometimes required to satisfy local ordinances which require this type of termination in specific locations within an installation. See "IBM information Display System Installation - Physical Planning", GA27-2787, for the mating receptacle which the customer must have installed. Note: This connector is provided for

208V unless 240V feature code <) (Canada only> #2831 <) (Canada only> is also specified. <)

## COMMUNICATIONS ADAPTERS

**Common Communication Adapter w/o Business Machine Clock (#6302):** (Mdl 21C, 31C, 51C) Required for communications at speeds up to 9600 bps (see "Limitation" below when a terminal Adapter(s) Type B (#7802-#7805) is installed). SNA/SDLC and BSC transmission control protocols are supported. Clocking must be provided by the modem or communications facility. Limitations: (1) #6303 must be ordered/installed in lieu of this feature, if SNA/SDLC protocol is required with a line speed greater than 7200 bps and a Category B Terminal Adapter(s) (#7802-7805) is installed. (2) This feature cannot be ordered/installed with #6303 or CCA with BMC (#6301). Maximum: One. Field Installation: Yes.

**High-Performance Comm. Adapter w/o Business Machine Clock (#6303):** (Mdl 21C, 31C, 51C) Required for attachment to communications lines at 9600 bps (SNA/SDLC transmission control protocol) when a #7801 (mdl 31C, or 51C with EFS only) is installed, and communication is through either an IBM or non-IBM external modem that provides its own clocking, or other communication facility that provides clocking. It is also required for all attachments with speeds greater than 9600 bps, for 51C attachment to the loops of the 8100 System at speeds up to 38.4K bps, for attachment to X.21 Switched Network, or for attachment to X.25 data transmission services. Limitations: (1) With this feature installed, operation is restricted to SNA/SDLC protocol. IML for BSC protocol is no longer possible. (2) This feature cannot be ordered/ installed with #6301 or #6302. (3) When EMI (#3701) is installed, speed is limited to 9600 bps maximum (up to 14.4K bps when used with a 5866 or 5868 mdl 18). Maximum: One. Field Installation: Yes. Specify: If to be used for X.25 operation, specify #9615. (This specify provides the special X.25 keyboard labels used on 3178s, 3278s or 3279s for X.25).

## COMMUNICATIONS INTERFACES

**CCITT V.35 Interface (#1550):** (Mdl 21C, 31C, 51C) Provides a cable and a CCITT interface for attachment to an external modem or other DCE complying with CCITT Recommendation (1976) V.35, ISO Standard 2593, other relevant CCITT Recommendations, and that provides clocking of up to 56K bps. Attachment to non-IBM DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3705 at speeds up to 57.6K bps. See "Specify" section for communication cable length. Limitations: (1) Cannot be installed with any other Communications Interface feature. (2) BSC is not supported at speeds greater than 9600 bps. Maximum: One. Field Installation: Yes. Prerequisites: (1) #6302 or #6303 for communications up to 9600 bps. (2) #6303 for communications above 9600 bps, or for X.25 operation up to a maximum of 9600 bps. Note: Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

**External Modem Interface (#3701):** (Mdl 21C, 31C, 51C) Provides a cable and a (Canada only> RS-232-C interface for attachment to an external IBM modem <) (Except Canada> CCITT interface for attachment to an external IBM modem or PTT-mandatory modem complying with CCITT recommendation (1976) V.24, V.26, ISO Standard 2110, and other relevant CCITT Recommendations <) that provides clocking of up to 9600 bps. Attachment to non-IBM modem or other DCE is subject to the provisions of the Multiple Supplier Systems Bulletin. May also be used for direct attachment to a 3704, 3705, 3720, 3721, 3725, 3726, 4331, or 8100 Processor at speeds up to 9600 bps (up to 14.4K bps when used with a 5866 or 5868 mdl 18). See "Specify" section for communication cable length. Limitations: Cannot be installed with any other Communications Interface feature. Maximum: One. Field Installation: Yes. Prerequisites: #6301, #6302 or #6303. #6303 is required for X.25 operation.

**Loop Adapter (#4850):** (Mdl 51C with EFS) Provides the ability to attach to a direct- or data link-attached loop of the 8100 System or

## MACHINES

a 4331 Processor. Direct loop attachment supports speeds up to 38.4K bps. Data link loop attachment supports 2400, 4800, and 9600 bps. A direct-attached loop can use a 9.6K or 38.4K Hz carrier; a data link-attached loop uses a 9.6K Hz carrier. Limitations: (1) Cannot be ordered with any other Communications Interface feature. (2) Cannot be ordered with #7801, if it will be used for 8100 attachment. (3) Cannot be ordered with #3680. Maximum: One. Field Installation: Yes. Prerequisites: #6303 and #9112 or #9124. Specify: On initial order or for change by service representative must be specified: #9825 for 9.6K Hz carrier or #9829 for 38.4K Hz carrier. To change specify on an installed machine, contact CE Branch Office. MES number 999999 is to be used for Incident Report (IR) completion data. (All terminals on a loop must use the same carrier frequency.)

**X.21 Adapter For Nonswitched Networks (#5655):** (Mdl 21C, 31C, 51C) An interface adapter for SDLC data transmission at speeds of 2400, 4800, 9600 or 48K bps on nonswitched communication facilities via a DCE complying with CCITT Recommendation X.21. See "Specify" section for communication cable length. Limitations: (1) Cannot be ordered with any other Communications Interface feature. (2) Does not support BSC transmission control protocol. Maximum: One. Field Installation: Yes. Prerequisites: (1) #6302 or #6303 for communications up to 9600 bps. (2) #6303 for communications at 48K bps, or for X.25 operation up to a maximum of 9600 bps. Note: Depending on the length and content of the data stream, it is possible that an occasional "temporary busy" condition due to 3274 buffering and processing constraints may be experienced at higher line speeds. The condition clears and data transfer resumes when a buffer becomes available.

**X.21 Adapter For Switched Networks (#5656):** (Mdl 51C w/EFS) An interface adapter for attachment to an X.21 switched network via a DCE complying with CCITT Recommendation X.21. SDLC communications at speeds of 2400, 4800, 9600 and 48K bps are supported. Keyboard decal and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. Limitations: (1) Cannot be ordered with any other Communications Interface feature. (2) Does not support BSC transmission control protocol. Maximum: One. Field Installation: Yes. Prerequisites: (1) #6303. (2) Configuration Support C (#9112) or D (#9124).

## TERMINAL ADAPTERS

**Terminal Adapter Type A1, A2, A3 (#6901, #6902, #6903):** (Mdl 21A, 21B, 21C, 31A, 31C, 31D) One each of these adapters can be installed. Each adapter provides for the attachment of an additional eight Category A terminals. It should be noted that two terminal ports are required to attach a Displaywriter System when it includes a printer. The base control unit, which provides for attachment of eight Category A terminals, can be expanded with these three terminal adapters to a maximum configuration of 32 Category A terminals. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s):

Terminal Adapter Type A1 (Terminals 9-16) - #6901  
Terminal Adapter Type A2 (Terminals 17-24) - #6902  
Terminal Adapter Type A3 (Terminals 25-32) - #6903

Limitations: #6903 is mutually exclusive with #7804, #7805. Maximum: One of each type terminal adapter. Field Installation: Yes. Prerequisites: #6902 requires #6901; #6903 requires #6902. Note: To attach Category A Terminals via the 3299, refer to RQs 8K1155 and 8K1156.

**Terminal Adapter Type B (#7801):** (Mdl 51C) Provides for the attachment of four Category B terminals, thus expanding the capability of the control unit up to 12 terminals. Limitations: (1) Cannot be installed with #4850 or any 2400, 4800, or 9600 bps Integrated Modem (#5640, #5740, #5840, #5842). (2) Requires EFS #1800 when IML'd for SNA/SDLC operation. Maximum: One. Field Installation: Yes. Prerequisites: #5550.

**Terminal Adapter Type B1 (#7802):** (Mdl 21B, 21C/BSC, 21D, 31A, 31C, 31D) Permits the attachment of four Category B terminals and provides for the installation of Terminal Adapter Types B2, B3 and B4 when additional Category B terminals are desired. Maximum: One. Field Installation: Yes.

**Terminal Adapter Type B2, B3, B4 (#7803, #7804, #7805):** (Mdl 21B, 21C/BSC, 21D, 31A, 31C, 31D) Each of these terminal adapters permits the attachment of four additional Category B terminals. A maximum of one each of these terminal adapters can be installed for a combined total of 12 additional or 16 total Category B terminals attached to a control unit. These terminal adapters must be installed in sequence, making it important to order the correct adapter feature code(s).

Terminal Adapter Type B2 (Terminals 5-8) - #7803  
Terminal Adapter Type B3 (Terminals 9-12) - #7804  
Terminal Adapter Type B4 (Terminals 13-16) - #7805

Limitations: #7804 and #7805 are mutually exclusive with #6903. Maximum: One of each type terminal adapter. Field Installation: Yes. Prerequisites: #7802.

## EXTENDED FUNCTION STORE

**Extended Function Store (EFS) - Type D4 (#1800):** (Mdl 51C) Provides 65,536 positions of additional control storage. Limitations: Cannot be installed with EFS-Types D1, D2, or D3 (#3630, #3631, #3632) or #1802. Maximum: One. Field Installation: Yes.

**EFS - Type D3 (#3631):** (Mdl 51C) Provides 32,768 positions of additional control storage. Maximum: One. Field Installation: Yes. Field installation only. Prerequisites: #3630.

**Extended Function Store (EFS) - Type C1 (#3650):** (Mdl 31A 31C, 31D, 51C) Provides 65,536 positions of additional control storage. Maximum: Two. Field Installation: Yes. (Except Canada > Field installation only.) Prerequisites: Mdl 31A, 31C, 31D - #3101 Integrated Diskette Drive Enhancement. Mdl 51C - #5101 Integrated Diskette Drive Enhancement or RQ 8K1071 and either #1800 Extended Function Store Type D4 or #3632 Extended Function Store Type D2 or #3631 Extended Function Store Type D3.

## CONTROL STORAGE FUNCTIONS

**APL/Text Control Function:** This function, selectable during the customization of a 3274 mdl 21A, 21C, 21D, 31A, 31C, 31D, or 51C expands the character handling capability of the 3274 to accommodate the APL, Text, and graphic plot character sets on 3180 mdl 130 (APL only), 3278s, 3262s (text only), 3268 mdl 2 and 2C, 3279s, 3287 attached via Type A Terminal Adapters (#6901, #6902, #6903), 4224s and 4234. Note: The 3274, with or without this APL/Text control function, does NOT support the 3270 Data Analysis/APL Feature (#1066) on attached 3277s or 3284s, 3286s or 3288s, NOR does it support the Text Print Feature (#7880) on attached 3288s.

**3289 Text Print Control Function:** This function, selectable during customization of a 3274 mdl 21A, 21C, 21D, 31A, 31C, 31D, or 51C, extends the character handling capability of the 3274 to accommodate the text characters (English US only) for the text print feature (#1130) on attached 3289s.

**Copy Function:** This function, selectable during the customization of a 3274 mdl 21C/BSC, 21D, 31C/BSC, 31D, or 51C, enables the copying of the screen contents of an attached 3178, 3179, 3180 mdl 1, 3278, or 3279 to an attached 3268, 3287, 3289, 3262, 4224, 4234, 4245 or 5210 through use of the Local Print Key on the display keyboard. This function is provided as basic on the 3274 mdls 21A, 21B, 21C/SNA, 31A and 31C/SNA. The ability to perform host initiated local copies from a 3178, 3278, or 3279, to a 3268, 3287, 3289, 3262, 4224, 4234, 4245 or 5210 attached to a 3274 mdl 21A, 21C/SNA, 31A or 31C/SNA is also provided as basic. In addition, the 3274 mdl 21C/BSC and 31C/BSC supports the 3270 host Copy command as basic.

## Local Copy Summary:

	Print Key	Host-Initiated
3274 Mdl		
21A, 31A	Basic	Basic
21B	Basic	Not

21C/BSC, 31C/BSC,	Cust.	Appl.
51C/BSC,	Option	Basic
21C/SNA, 31C/SNA,	Basic	Basic
51C/SNA,		
21D, 31D	Cust.	Not
	Option	Appl.

**Host-Loadable Print Authorization Matrix:** This function, selectable during the 3274 customization process, provides the capability for the 3274, during subsequent IBM procedures, to receive, from a user-written application program at the host CPU, an updated Printer Authorization Matrix to override the matrix created by the customization operator or by system default.

**Between Bracket Printer Sharing Function:** This function, selectable during the customization of a 3274 mdl 21A, 21C/SNA, 31A, 31C/SNA, or 51C/SNA enables attached 3268s, 3287s, 3289s, 3262s, 4224s, 4234, 4245s and 5210s to be used as Local Copy output devices for the screen contents of attached 3178s, 3179s, 3180 mdl 1s, 3278s, and 3279s, when the printers are Between Brackets with the host application program. Printers are available for Local Copy operations only when they are not in session with an application program if this option is not selected.

**Color Convergence Function:** This function, selectable during the customization of any mdl 3274, provides the mechanism through which the operator of a 3279 can perform color convergence for the 3279.

**Programmed Symbols (PS) Function:** This function, selectable during the customization of any mdl 3274 except mdl 1B, enables the customer to define, store, and access up to six, 190-symbol sets on appropriately featured 3278s and 3279s, 3268 mdl 2C and 3287s. Prerequisites: SFAP.

**Decompression Function:** This function, selectable during the customization of any mdl 3274 except mdl 1B, decompresses data streams containing compressed Programmed Symbols generated by the Graphical Data Display Manager (GDDM) program product. Its usage is recommended for all 3274 TP host attachments that use GDDM. Prerequisites: SFAP.

**Extended Attribute Terminals:** This function, selectable during the customization of any mdl 3274 except mdl 1B, establishes an internal control table for each terminal on which Extended Color, Extended highlighting, and Programmed Symbols will be used or when a 4250 will be attached. If more extended attribute terminals are attached to the 3274 than are specified during customization, the excess terminals will execute only base-level function. Prerequisites: SFAP.

**SFAP:** This function, selectable during customization, provides a new 3270 command and several new orders that extend the functional capabilities of appropriately featured 3268 mdl 2Cs, 3179s, 3180 mdl 1s, 3278s, 3279s, 3287s, 3262s, 4224s, 4234 and 4245s. Data streams sent to these attached terminals can include extended color, extended highlighting, query function or programmed symbols, in any combination. Prerequisites: BSC hosts that utilize this function must transmit in transparent-text mode.

**X.21 Switched Network Operation:** (Mdl 51C) This function, selectable during customization for SNA/SDLC operation, is required for attachment to the X.21 Switched network. It provides the controls necessary to support the CCITT X.21 switched network protocols.

**X.25 Support:** (Mdl 31C, 51C) This function, selectable during the customization of a 3274 mdl 31C or 51C, provides for attachment to X.25 data transmission services having an interface which complies with Recommendation X.25 (Geneva 1980) of the International Telegraph and Telephone Consultative Committee (CCITT). IBM conformance to this X.25 interface is defined in "IBM General Information Manual - The X.25 Interface for Attaching IBM SNA nodes to Packet-Switched Data Networks", GA27-3345. Keyboard labels on attached 3178s, 3278s or 3279s keyboards and display screen indicators are provided for operator reference during the calling, data exchange, and disconnecting phases. See "X.25 Keyboard Labels" under "Accessories" for details on the labels re-

quired for selected keyboards on terminals connected to a 3274 attached to a X.25 communications facility. Limitations: Encrypt/Decrypt (#3680) is mutually exclusive with 3274 X.25 capability. The cryptographic feature cannot be used with X.25 operation. Prerequisites: (1) Configuration Support P or D at release level 63.1 or higher. (2) SNA/SDLC protocol. (3) Configuration Support P requires 128K, and Configuration Support D requires 256K of control storage (two #3650) to support X.25. The Communications Interface feature required depends upon the X.25 physical interface provided by the network. (4) One of the following Communications Interfaces: #3701, #5655 or #1550. Note: The maximum line speed supported with any of these Communications Interface features is 9600 bps with X.25. The Communications Interface feature required depends upon the X.25 physical interface provided by the network. (5) #6303.

**3274 Entry Assist:** This function provides capabilities which facilitate entry and editing of text material. The capabilities include margins, tabbing, word wrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. Entry Assist is supported for the following keyboard languages/character sets: Brazilian, Canadian Bilingual 125-character set RPQ, International, Japanese English, Spanish Speaking, English UK, and English US. (On 3274s with Configuration Support C, 3274 Entry Assist is available via RPQ 8K1147.)

**Alert Function:** This function, selectable during the customization of a 3274 mdl 31A, and on SNA mdls of the 31C and 51C, reports problem determination data to the host, for recording and display, when NPDA Version 3 is installed in the host.

**Response Time Monitor:** This function, selectable during the customization of 3274 mdls 31A, 31C, 31D, 51C, provides the capability for enhanced network management by accurately measuring transaction times. Response times are collected in up to four user-defined levels. Response time end-definition is defined by the user and can be one of the following: First Character, Keyboard Usable, or Change Direction/End Bracket (SNA only). The response time information can be displayed at a user-designated display station attached to the 3274. Prerequisites: #6101.

**Keyboard Definition Utility:** This pre-customizing option is available on 3274s with Configuration Support D release level 63 microcode. The utility is for modifying layouts of keyboards that are used on the 3179s and 3180 mdl 1s. The utility provides the capability to define the layout of up to four keyboard layouts. Prerequisites: Mdl 31X -- #9124 (Release Level 63), #3650, #3101. Mdl 51X -- #9124 (Release Level 63), #3650, #5101 or 8K1071, #1800 or #1802 and #3632, or #1802, #3630, #3631. Note: To redefine an APL layout, the display doing the modification must have an APL character generator.

**3270 Personal Computer (Control Unit Terminal Mode):** This function allows the 3270 Personal Computer to appear as a single 3178, 3278 or 3279.

**(Canada only) IBM Personal Computer Attachment Support:** This function, selectable during the customization of any mdl 3274, except mdls 1B and 21X, provides support for attachment of an IBM Personal Computer to a 3278 or 3279. Prerequisites: SFAP. <)

## MODEL CONVERSIONS

See table below for field installation of model conversions:

	1	1	21	21
	A/B/D	C	A/B/D	C
FROM MODEL	TO MODEL	-	-	-
1A/B/D	Yes (1)	No	NR	No
1C	No	--	No	NR
21A/B/D	NR	No	Yes (1)	No
21C	No	NR	No	--
31A/D	NR	No	NR	No
31C	No	NR	No	NR
51C	No	No	No	No

## MACHINES

	31	31	51
	A/D	C	C
FROM MODEL	TO MODEL	-	-
1A/B/D	Yes	No	No
1C	No	Yes	No
21A/B/D	Yes (2)	No	No
21C	No	Yes	No
31A/D	Yes	No	No
31C	No	--	No
51C	No	No	--

NR = Field Installation NOT recommended

### Notes:

1. When making mdl conversions, the applicable Control Storage Requirement Table must be used to determine if sufficient control storage is available. Also, when converting mdls, refer to FIVE3270 to evaluate expected performance.
2. The 3274 mdls 21A/B/C/D contain the newer storage technology which facilitates upgrading to mdls 31A/C/D at a reduced cost.

## ACCESSORIES

**Battery, Mercury:** To provide power to sustain the master key of the Encrypt/Decrypt feature #3680 on the 3274 when normal power is

not present. A 4.14 volt mercury battery (P/N 1743456). This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered by DP Supply Order from Mechanicsburg. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

**X.25 Keyboard Labels:** Stick-on labels are used on the keyboards of 3178s, 3278s and 3279s attached to a 3274 mdl 31C or 51C using X.25 communications facilities. These labels are normally provided with the 3274 feature #6303 when Specify feature #9615 is specified to indicate that X.25 will be used. If new or additional labels are required, they can be obtained by ordering Form Number GX23-0285. Each Form Number is a sheet containing 16 sets of stick-on labels, enough for 16 keyboards, and the installation procedure for installing the labels.

**Keycap Accessory Kits:** For Keycap Accessory Kits to be used with the Keyboard Definition Utility, refer to "Accessories" in the M3179 and M3180 pages.

## SUPPLIES (NONE)

## 3274 CONTROL UNIT MODELS 41, 61C

### PURPOSE

Provides the capability of attaching 3270 Information Display System displays and printers to System/3, S/360, S/370, 4300, 303X, 3081, 308X, 3090, 9370 processors, and the 8100 Information System. The models 41A, and 41D are for local channel attachment. The models 41C, and 61C are used for communicating in data half-duplex mode via half-duplex or duplex communications facilities.

For S/3 attachment, each of the control units can communicate via Binary Synchronous Communications (BSC) in data half-duplex mode over half-duplex or full-duplex communications facilities with a suitably equipped S/3 model 4, 8, 10, 12, or 15 at speeds up to 9600 bps.

### ATTACHABLE TERMINALS

#### Category A Terminals:

- 3178 mdl C1, C2: Display Station
- 3178 mdl C3, C4: Display Station (see Note 4)
- 3179 mdl 1: Color Display Station
- 3179 mdl G: Color Graphics Display Station
- 3180 mdl 1: Display Station
- 3191 (See M3191 pages for models): Display Station
- 3192 (See M3192 pages for Models): Display Station
- 3193 mdl 1, 2: Display Station (see Note 6)
- 3262 mdl 3, 13: Line Printer
- 3268 mdl 2: Impact Matrix Printer
- 3268 mdl 2C: Color Impact Matrix Printer
- 3270 Personal Computer
- 3278 mdl 1, 2, 3, 4, 5: Display Station
- 3279 (except mdl 2C): Color Display Station
- 3287 mdl 1, 2: Impact Matrix Printer
- 3287 mdl 1C, 2C: Color Impact Matrix Printer
- 3289 mdl 1, 2: Line Printer
- 3290: Information Panel Display
- 4224 mdl 201, 202, 2E2: Impact Matrix Printer (See notes 4 and 5)
- 4224 mdl 2C2: Color Impact Matrix Printer (See notes 4 and 5)
- 4234 mdl 1: Dot Band Printer
- 4245 mdl D12, D20: Line Printer
- 4250: APA Printer (see Notes 1 and 2)
- 5150: Personal Computer (via 3278/79 Emulation Adapter)
- 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only): Personal Computer XT/370
- 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only): Personal Computer AT/370 (Canada only)
- 5160 mdl 589 (Control Unit Terminal Mode only): Personal Computer XT/370
- 5170 mdl 599 and mdl 739 (Control Unit Terminal Mode only): Personal Computer AT/370 (<)
- 5210 mdl G1, G2: Printwheel Printer
- 6580 mdl A04, A06, A08, A10, B04, B06, B08, B10; w/#8332 and LP 5608-SR9 (see Note 3): Displaywriter System

Mdl 41A, 41C, 41D and 61C control units have 192K bytes of control storage and support all terminal features.

The basic mdl 41A, 41C and 41D control units allow attachment of 32 Category A terminals.

The basic mdl 61C control unit allows attachment of 16 Category A terminals.

#### Notes:

1. Attachment to 3274 mdls 41C and 61C requires printer RPQ 7B0980.
2. Because of the high data volumes possible with this printer, it is strongly recommended that the "IBM 3274 Performance

Guidelines, Technical Bulletin", ZZ20-4167, be used IBM be contacted to predict the effect the 4250 has on subsystem performance.

3. Two terminal ports are required to attach a 6580 which includes a printer. Mdl C3, C4 support requires RPQs. See "Prerequisites" section of the M3178 pages for details.
4. All 4224 Printer models support the Intelligent Printer Data Stream (IPDS).
5. When attaching the 4224 to a control unit using Configuration Support D at Release 65.0, contact the NSD representative for support information; refer them to 3274 RETAIN TIP #756.
6. RPQ 8K 1311 should be installed on 3274 mdl 41A.

### MODELS 41, 61

**Model 41A A41:** For local (SNA version) attachment, via a byte multiplexer, selector, or "block multiplexer channel, to a S/370, 30XX processor; or a 4300 Processor via a byte multiplexer or multiplexer channel.

**Model 41C C41; 61C C61:** For communicating in data half-duplex mode over half-duplex or duplex communications facilities with the following:

- A S/370, 30XX, 4300 or 9370 Processor via 3704, 3705, or 3725 (or via the Communications Adapter feature on the 4321, 4331 or a Telecommunication Subsystem Controller on the 9370), using Synchronous Data Link Control (SDLC/SNA).
- A S/370, 30XX, 4300 or 9370 Processor via (where applicable) 2701, 2703, a 3704, 3705 or 3725, or a Communications Adapter feature on the 4321, 4331 or a Telecommunication Subsystem Controller on the 9370, using Binary Synchronous Communications (BSC).
- S/370 mdls 115, 125, 135 and 138 via Integrated Communications Adapter (ICA) using BSC.
- S/360 mdls 30, 40, 50, 65, 75, and 195 via 2701, 2703, or a 3704 or 3705 using BSC.
- 4331/4361 Processor - The mdl 61C can also attach to a 4331 via a direct- or data link-attached loop using SDLC.
- A 4341, 4361, 4381, 303X, 308X or 3090 processor via 3720 using Synchronous Data Link Control (SDLC/SNA) or BSC.
- 8100 Information System - The mdl 61C can attach using SDLC via a data link or a direct-attached or data link-attached loop.

**Model 41D D41:** For Local (3272 version) attachment, via a byte multiplexer, selector or "block multiplexer channel, to a virtual storage S/370 processor, or a 4300 processor via a byte multiplexer or block multiplexer channel.

\* Attachment to a non-DCC subchannel of a block multiplexer channel or to a selector channel is not recommended due to performance considerations which may yield less than maximum throughput.

#### Prerequisites:

1. One 3178, 3179, 3180 mdl 1, 3278, or 3279 with keyboard is needed on each 3274 as a diagnostic aid. It must be attached to the first terminal address on the control unit (Port 0). (This display station may be attached via a 3299.)
2. A 3274 mdl 41C requires a Communications Adapter and a Communication Interface for communications. An external Data Circuit-Terminating Equipment (DCE) is required with the External Modem Interface (#3701) or the CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655) unless the 3274 model 41C is to be direct connected. The Data Circuit-Terminating Equipment or direct connected unit to which the 3274 mdl 41C is attached must provide clocking.

- The 3274 mdl 61C requires a Communications Adapter and a Communications Interface for host communications. An external DCE may be required with the External Modem Interface (#3701), and the CCITT V.35 Interface (#1550), and the CCITT X.21 Interface (#5655 and #5656).

**Customer Setup (CSU):** The 3274 mdls 41C, and 61C are Customer Setup, thereby offering the customer early availability and terminal relocation flexibility. The customer is responsible for attaching CSU units to the 3274. For additional information on CSU, refer to GI section. contact IBM.

## HIGHLIGHTS

These units can attach up to 32 (16 on the mdl 61C) displays, and/or printers, unless a 6580, which includes a printer, is to be attached. A 6580 without a printer requires one terminal port (the same as other terminals), but when a 6580 includes a printer, two terminal ports are required to attach. All terminals attached to the controller can be driven at distances up to 610m (2,000 ft) using shielded twisted pair or 1,500m (4,920 ft) using coaxial cable. (3289 attaches with coaxial cable only.)

The 3274 can communicate with a S/360, S/370 or 4300 Processor by local channel attach or remotely via communications facilities. The channel-attached Control Units are mdl 41A for SNA operation with extended data stream handling capabilities, and mdl 41D for 3272-like operation with extended data stream handling capabilities. The mdls 41C and 61C can operate with extended data stream handling capabilities using either BSC or SNA/SDLC.

The mdl 61C can also attach via a Data Link to the 8100 Information System or to the 8100 or 4331/4361 via a direct- or data link-attached Loop.

The flexibility of 3274s enables the user to configure a display sub-system for initial requirements, and later change hardware and functions to meet future needs. Function configurability is attained through Configuration Support options, via feature and System Diskettes.

One Feature Diskette and two System Diskettes, and (except Canada) a Language Diskette are shipped with each 3274. An Encrypt/Decrypt Feature Diskette is also shipped with the Encrypt/Decrypt feature (#3680) on a 3274 mdl 41C, or 61C. As part of the installation procedure, a customized System Diskette is generated. The generation process is accomplished by the customer keying in system configuration parameters. A unique configuration table is written on the System Diskette along with the necessary control code to accomplish the functions. For example, during subsequent control unit loading or initialization of a mdl 41C, or 61C, BSC or SNA/SDLC mode of operation is determined by the configuration recorded on the System Diskette used. It is possible to create two different System Diskettes; one to be used for BSC operation and the other to be used when operating SNA/SDLC.

The control unit is initialized with control code and configuration parameters as a result of Power On or by pressing the IML push-button. The load occurs from an integrated diskette drive using the previously customized System Diskette. The loading process starts with the execution of extended tests contained on the diskette.

The character set to be used on attached terminals is specified on the customized IML Diskette during installation procedure. All attached terminals must have the same character set.

Detailed information for initial customizing, for customizing made necessary by changing configurations, and for optionally updating the diskettes, is contained in the "IBM 3274 Control Unit Customizing Guide", GA23-0065.

**Katakana Support:** The 127-Character (plus space and null) support is an enhancement of previously announced 3270 Japanese Katakana. Katakana terminals will not be 3270 compatible for customers using the NL and EM codes. Customers who do not use the NL and EM codes will be 3274 and 3276 compatible. For detail, see appropriate SRLs.

## COMMUNICATIONS

The 3274 mdls 41C or 61C communicates with a 4341, 4361, 4381, 303X, 308X or 3090 processor using SDLC or BSC in half-duplex mode over duplex or half-duplex communication facilities to a 3720.

The 3274 mdl 41C or 61C communicates with a S/370 or 4300 Processor using SDLC over duplex or half-duplex communications facilities to a 3704, 3705, or 3725 or via the Communications Adapter on the 4321/4331/4361 (SNA/SDLC), or by BSC to a S/360, S/370 or 4300 Processor, over duplex or half-duplex communications facilities via (where applicable) a 2701, 2703, or a 3704, 3705, 3725 (the 3725 is not connectable to the S/360), or the communications Adapter on a 4321 or 4331. Communications with a 4331 processor is also provided via a direct- or data link-attached loop for the mdl 61C.

Communications with a S/370 mdl 115, 125, 135, or 138 can also be via the Integrated Communications Adapter (#4640) and appropriate BSC features on a 3115, 3125, 3135, or 3138.

The mdl 61C communicates with the 8100 Information System, using SDLC, via data link, a direct- or data link-attached loop, or direct connection.

SDLC as used in the 3274 mdl 41C and 61C conforms to a subset (unbalanced normal mode) of both the ISO HDLC and ANSI ADCCP standards. For details of this conformance, see "General Information Manual, IBM Synchronous Data Link Control", GA27-3093.

A 3274 mdl 41C or 61C can be used with X.25 communications facilities by customization with Configuration Support D (release level 63.1 or higher). Appropriate hardware features must be installed to support Configuration Support D operation with X.25. See "X.25 Support" under "Control Storage Functions" and Configuration Support D description for details.

**Performance:** For many 3274 mdl 41C, and 61C systems, response time is limited by transmission line speeds. For these cases, applicable line speed upgrades can be translated into immediate response time improvements. However, performance is also data stream-dependent. Refer to IBM Aids for performance evaluation information.

**Communications Facilities:** The 3274 mdl 41C, or 61C operate in half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities, using SDLC or BSC, at transmission speeds of 1200 (61C only with a modem supplied clock), (Canada only >2000, <) 2400/1200, 4800/2400, 7200/3600 and 9600/4800 bps on nonswitched facilities. In addition, the 3274 mdl 61C operates in half-duplex point-to-point mode using SDLC at transmission speeds of 1200 (with a modem supplied clock), 2400/1200, 4800/2400, and 9600/4800 bps on switched facilities. See M2700 pages for facilities.

The 3274 mdl 61C also operates in half-duplex mode at 9600 or 38,400 bps over a direct-attached loop, and at 2400, 4800, or 9600 bps over a data link-attached loop.

Multipoint and point-to-point communications at speeds up to 56K bps are also possible where facilities are available. In addition, communications through a 3705, 3720, 3721, 3725, 3726 or to the Local Attachment Interface #4801 on the 4331 or to an 8130/8140 Processor can be via direct connection without the need for communications facilities or modems. All communications at speeds greater than 9600 bps must use SDLC. See M3705, 3720, 3721, 3725, 3726, 4331, 8101, 8130 and 8140 pages for details.

**Modems:** Unless the 3274 mdls 41C, or 61C will be direct connected, an external Data Circuit-Terminating Equipment (DCE) is required when the External Modem Interface (#3701) or CCITT V.35 Interface (#1550) or CCITT X.21 Interface (#5655 or #5656) is installed.

Modem	Speed (bps)	Line
3863 mdl 1/2	2400/1200	Nonsw or

## MACHINES

3864 mdl 1/2	4800/1200	Sw Voice Grade Nonsw or Sw Voice Grade
3865 mdl 1/2	9600/4800	Nonswitched
3868 mdl 1	2400/1200	Nonswitched
3868 mdl 2	4800/2400	Nonswitched
3868 mdl 3/4	9600/4800	Nonswitched
3872 mdl 1	2400/1200	Nonsw Voice Grade*
3976 mdl 3	1200/600	Nonsw or Sw Voice Grade**
5811 mdl 10	2400/4800/ 9600	Limited Distance Modem
mdl 18	Rack mount version of mdl 10	
5865 mdl 1	9600/7200/ 4800	Nonswitched
5866 mdl 1	14.4K/12K	Nonswitched
(5865 mode)	9600	Nonswitched
5868 mdl 10	Rack mount version of	

mdl 18	5865 Rack mount version of 5866	
5979 mdl L41	9600	Limited Distance COAM**

\* Canada only  
\*\* Except Canada

Switched network backup (SNBU) operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1. 4-wire SNBU operation with Manual Call and Auto Answer is available on the 3863 mdl 1, 3864 mdl 1, and 3865 mdls 1 and 2. For communications capabilities, product utilization and features, see M2700, 3863, 3864, 3865 and 3872 pages.

**Direct Connection Attachment:** In addition to host attachment via modems or other data circuit-terminating equipment (DCE), attachment can be made by direct connect, without the need for intervening DCE. The direct connect is made by using either the External Modem Interface (#3701) or the V.35 Interface (#1550), the corresponding host interface feature(s), and a connecting cable. Shown below are the hosts that provide direct connection attachment for

## 3276 CONTROL UNIT DISPLAY STATION

### PURPOSE

A cathode-ray tube (CRT) display station used for displaying alphanumeric data, and for entering data into and receiving data from a S/370, a 30XX, a 4300 Processor, a 3790 Communication System, a S/360, an 8100 System or a 9370. The 3276 optionally provides control and multiplexing capabilities to support up to seven 3230 mdl 2s, or 3262 mdl 13s, or 3268 mdl 2s and 2Cs, or 3178s, or 3179s, or 3180 mdl 1s, or 3191 mdl A1X, B1X, (Except LAD>, A3X, B3X,<) or 3192 mdl C1X, C3X, D1X, D3X, or 3278s, or 3279s, or 3287s, or 3289s, or 4224 mdl 2XXs, or 4234 mdl 1s, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, allowing a maximum cluster size of eight displays or printers including the 3276's own display. The 6580 Displaywriter System can connect to 1 or 2 terminal ports (display station, or display station and printer). A keyboard, or a selector light-pen, permit an operator to display and manipulate data on the screen in a flexible and efficient manner. The 3276 meets both general and unique display requirements with its set of basic and optional features.

3276 communicates with a S/370, 4300 Processor or 9370, using Synchronous Data Link Control (SDLC) or Binary Synchronous Communications (BSC) over communications facilities; or with a S/360, S/370, 4300 Processor or 9370, using BSC over communications facilities; or with a 3790 Communication System using SDLC over communications facilities; or with an 8100 System using SDLC via a communication link, or a direct-or data link-attached loop or with a 4331 using SDLC via a direct-or data link-attached loop.

### MODELS

**Models 1-4:** For use with BSC transmission control.

**Model 1 001:** Displays up to 960 characters ... 12 lines of 80 characters each.

**Model 2 002:** Displays up to 1,920 characters ... 24 lines of 80 characters each.

**Model 3 003:** Displays up to 2,560 characters ... 32 lines of 80 characters each.

**Model 4 004:** Displays up to 3,440 characters ... 43 lines of 80 characters each.

**Models 11-14:** For use with SNA/SDLC transmission control.

**Model 11 011:** Displays up to 960 characters ... 12 lines of 80 characters each.

**Model 12 012:** Displays up to 1,920 characters ... 24 lines of 80 characters each.

**Model 13 013:** Displays up to 2,560 characters ... 32 lines of 80 characters each.

**Model 14 014:** Displays up to 3,440 characters ... 43 lines of 80 characters each.

**Note:** Mdls 1 and 11 have a 480-character mode for existing 480-character programs, and mdls 3, 4, 13 and 14 have a 1,920-character mode to accommodate existing 1,920-character programs.

### Attachable Terminals

3178 mdl C1, C2*	Display Station
3178 mdl C3*	Display Station
3178 mdl C4*	Display Station
3179 mdl 1*	Color Display Station
3180 mdl 1* **	Display Station
3191 mdl A1X, B1X	Display Station
(Except LAD>	

3191 mdl A3X, B3X<)	
3192 mdl C1X, C3X	Display Station
D1X, D3X	
(Except Canada>	
3230 mdl 2	Printer<)
3262 mdl 13	Line Printer
3268 mdl 2 & 2C	Printer
3278 mdl 1, 2,	
3, & 4*	Display Station
3279 mdl 2A, 2B,	
3A & 3B*	Color Display Station
3287 mdl 1, 2,	
1C & 2C	Printer
3289 mdl 1 & 2	Line Printer
4224 mdl 2XX	Printer
4234 mdl 1	Dot Band Printer
5210 mdl G1, G2	Printwheel Printer
6580 mdl A04,	
A06, A08, A10	Displaywriter System
	(25-Line Display)
6580 mdl B04,	
B06, B08, B10	Displaywriter System
	(66-Line Display)

\* For 3178, 3179, 3180 mdl 1, 3278, 3279 model restrictions, see "Attachment Matrix" under "Terminal Adapters" in "Special Features".

\*\* The 3276 supports the 3180 mdl 1 only when the 3180 is emulating a 3278 mdl 2-4. The 3276 does not support the 3180 extended functions or the 27x132 character screen format.

The 3276 does not support Programmed Symbols, Extended Color, or Extended Highlighting on a 3268, 3179, 3278, 3279, 3287, or a 5210.

The 3276 does not support the Intelligent Printer Data Stream (IPDS) Mode of the 4224 mdl 2XX Printer.

For use with 3790 Communication System: The 3791 Controller supports only selected models of the 3276 and the 1,920 character mode. See the 3791 Configurator, (Canada only> GA27-2768,<) (Except Canada> GA19-0111,<) and M3791 pages for additional details.

For use with an 8100 System: See the "8100 System Configurator", GA27-2876, and refer to the M8130/8140, 8101 pages and programming pages for possible support restrictions.

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation Adapter (#8332).

**Prerequisites:** The 3276 requires an integrated, or external modem, or an X.21 Adapter for Switched Networks, or an X.21 Adapter for Nonswitched Networks for TP attachment, or a loop adapter for 8100 System loop attachment. A keyboard is needed on each 3276 for diagnostic purposes.

**Customer Setup (CSU):** The 3276 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

Displays a character within a 7x14 character matrix in 960, 1,920 and 2,560-character mdls; within a 7x11 character matrix in the 3,440-character mdl. The basic 26-character upper case letters are presented in a 7x9 character matrix for the 960, 1,920 and 2,560-character mdls, and in a 7x8 character matrix for the 3,440-character mdl. Displays a 94-character set: 62 alphanumeric and 32 special characters, not including the Space and Null characters. The display character set may be restricted to upper case characters by the monospace switch. Uses 3270 Field Formatting capability which permits individual fields of data on the screen to

be program-defined with various attributes such as protected/unprotected, alphameric, normal/highlighted intensity, displayable/non-displayable, and selector light-pen detection allowed/disallowed. All terminals attached to the controller can be driven at distances up to 610m (2,000 ft) using shielded twisted pair or 1,500m (4,920 ft) using coaxial cable. (3230 and 3289 attach with coaxial cable only).

The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of a 3178, 3179, 3180 mdl 1, 3191 mdl A1X, B1X, (Except LAD > A3X, B3X, <) 3192 mdl C1X, C3X, D1X, D3X, 3276, 3278, 3279, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, attached to a 3276. (Order RPQ 8K0929 or 8K0991 on mdls 1, 3 and 4 using BSC when all the following operating conditions are expected:

- Operator use of the print key for a local copy on a printer that is also used by the host.
- The host does not use general poll.
- The host does not issue specific poll after a printer has completed a host printout.

The printer designation is controlled by a configuration default matrix which is fixed by the relative port positions of displays and printers attached to the 3276. Other printers may be accessed using the IDENT key.

Devices attached to the 3276 are assigned port positions 1-8. Displays are authorized to print only to printers which are attached to higher numbered ports. If the IDENT key is not used, a PRINT operation from a given display will cause printing to take place at the first printer whose port position is higher than the display. The operator may use the IDENT key to print to any printer. (The host can perform copy in a manner compatible with existing 3271/ 3272 support.)

**Operator Factors:** The 3276 has an anti-glare screen. Indicators are displayed on the bottom row of the screen, outside the data display area, and provide useful operator information. Host display of data on the screen is accomplished without refresh interrupt (i.e., no blinking). The keyboard, which is low in profile, provides a palm rest area, and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes.

**Cluster Capability:** Up to seven 3262s, 3178s, 3179s, 3180 mdl 1s, 3191 mdl A1X, B1X, (Except LAD > A3X, B3X, <) 3192 mdl C1X, C3X, D1X, D3X, (Except Canada > 3230s, 3262s, <) 3278s, 3279s, 3268s, 3287s, 4224 mdl 2XX, 4234 mdl 1s, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, 3289s or a 5210 may be attached. The basic 3276 provides a display and a port for one device: a 3178, 3179, 3180 mdl 1, (Except Canada > 3230, <) 3262, 3268, 3278, 3279, 3287, 4234 mdl 1, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10, 3289 or a 5210. Up to three Terminal Adapters, each controlling up to two devices, can be attached to the 3276. The 3276 allows the attachment of seven additional displays and/or printers for a maximum cluster size of eight including its own display. The 6580 Displaywriter System can connect to one or two terminal ports (display station, or display station and printer) ... see "Special Features".

**Editing Functions:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic. All alphameric, special symbol, and cursor move keys have typamatic capability. Double-speed cursor typamatic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the selector light-pen function. Fields of data may be selected by positioning the cursor and then using the cursor select key.

**Input Flexibility:** A choice of keyboards or the selector light-pen provide input flexibility ... see "Special Features" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 program function (PF) keys are basic with all typewriter keyboards.

**Security Functions:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data

entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display buffer unless the key is turned to the "on" position. An Address Keylock (optional) controls access to the address switches. These capabilities and the terminal's ability to identify itself to the host program (SNA/SDLC operation only), allow customer-supplied security program routines to control access to data and audit of actions. A Magnetic Slot Reader is available to enter system user identification. An Encrypt/Decrypt feature (optional) protects data transmitted over unsecured communication lines from accidental or intentional disclosure and/or modification (mdls 11-14 in S/370 or 4300 processor attachment only).

**Audible Alarm:** An alarm, sounded under program control, to alert the operator to a operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone.

**Keyboards:** One is needed on each 3276 for diagnostic testing. Refer to the Type Catalog section for keyboard layouts.

**Communications:** The 3276 mdls 11-14, and the 3276 mdls 1-4 with the SDLC/BSC Switch (#6315) communicate with a S/370 or 4300 processor using SDLC transmission over communications facilities (where applicable) to a 3704, 3705, or 3725, or a Communications Adapter (#1601) feature on the 4331. The 3276 mdls 11-14, and the 3276 mdls 1-4 with the SDLC/BSC Switch (#6315) communicate with a 4341, 4361, 4381, 303X, 308X or 3090 processor using SDLC over duplex or half-duplex communication facilities to a 3720. The 3276 mdls 1-4 communicate with a S/360, S/370 or 4300 processor, using BSC transmission over communications facilities (where applicable) to a 2701, 2703, 3704, 3705, 3725 (see note), an Integrated Communications Adapter (3115, 3125, 3135 or 3138), or a Communications Adapter (#1601) feature on the 4331. See M3791 pages for specific models. All mdls of the 3276 can also communicate with a 3704, 3705, or 3725, or a Communications Adapter (#1601) feature on the 4331, at 1200 bps without need for communications facilities or a modem. The 3276 mdls 11-14 communicate with a 4331 Processor using SDLC transmission via a direct or data link attached loop. The 3276 mdls 11-14 communicate with an 8100 System using SDLC transmission via a data link, or a direct or data link attached loop. The 3276 mdls 1-4 with the SDLC/BSC switch (#6315) can communicate with the 8100 System using SDLC transmission via a data link.

**Note:** The 3725 is not connectable to a S/360.

For TP attachment, each 3276 must be equipped with one of the communications features (#6301 or #6302) and either the External Modem Interface (#3701), an X.21 Adapter for Switched Networks (#5656), or an X.21 Adapter For Nonswitched Networks (#5655), or one of the 1200 bps Integrated Modem features (#5500, #5501 or #5508). In addition, #6315 may be selected on mdls 1-4 (see above).

For loop attachment (3276 mdls 11-14) each 3276 must be equipped with #6302 and #4850.

**Communication Facilities:** The 3276 operates in data-half-duplex point-to-point or multipoint mode on half-duplex or duplex non-switched communication facilities at speeds of 1200, 2000, 2400, 4800, 7200 or 9600 (SNA/SDLC only) bps. In addition, the 3276 mdls 11-14 operate in data-half-duplex point-to-point mode on the public switched telephone network at speeds of 1200 and 4800 bps and on public switched data networks at speeds of 2400, 4800, and 9600 bps. See the M2700 pages for information on the communication facilities over which this operation can occur. The 3276 mdls 11-14 also operate in half-duplex mode at 9600 bps over a direct attached loop, and at 2400, 4800 or 9600 bps over a data link-attached loop.

**Modems:** If a Loop Adapter (#4850) (mdls 11-14 only), or an X.21 Adapter for Switched Networks (#5656) (mdls 11-14 only), or an X.21 Adapter for Nonswitched Networks (#5655) (mdls 11-14) is not installed, a 1200 bps Integrated Modem feature or an external IBM modem may be attached to a 3276. External modems require the External Modem Interface (#3701).

Modem	Speed	
(models)	(bps)	Lines



IBM Canada Ltd.

# MACHINES

M 3276.3  
MAR 87

3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1/2	2400/1200	Nonswitched or switched voice grade
3864-1/2	4800/2400	Nonswitched or switched voice grade
3865-1/2	9600/4800	Nonswitched voice grade
3868-1	2400/1200	Nonswitched voice grade
3868-2	4800/2400	Nonswitched voice grade
3868-3/4	9600/4800	Nonswitched voice grade
3872-1	2400/1200	Nonswitched or switched voice grade*
3976-3	1200/600	Nonswitched or switched voice grade
5811-10	2400/4800/9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400/4800/7200/9600	Nonswitched baseband
5811-28		Rack mount version of 5811-20
5812-10	2400/4800/7200/9600	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-2/3	9600/7200/4800	Nonswitched voice grade
5866-1/2/3	14400/9600	Nonswitched voice grade
5868-52		Rack mount version of 5865-2
5868-61/62		Rack mount version of 5866-1/2
5979-L11/12	9600	Limited distance COAM**

\* Canada only. \*\* Except Canada.

**Note:** 4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

Switched network backup operation with Manual Call and Manual or Auto Answer is available on the 3872 mdl 1. For communications capabilities, product utilization and special features, see M2700, 3976, 3863, 3864, 3865, and 3872 pages.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that are easily understood and used by the operator. See "Customer Responsibilities".

Network Problem Determination Application (NPDA), a program product, operates with VTAM and TCAM to assist in performing

communication network problem determination/ isolation and enhances the availability and serviceability of the 3276 for the above environments in BSC (except when attached to the 4331 via direct or data link-attached loop) and SDLC mode. See NPDA in the Program Products section.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at customer's receiving dock, unpacking and placement of 3276.
3. Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings, and check out.
4. Contacting Customer Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
5. Notifying IBM of intent to relocate and follow IBM instructions for relocation.
6. Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
7. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

**Publications:** See "KWIC Index", G320-1621 or specific system bibliography.

## SPECIFY

Specify Codes, except for WT power requirements, nomenclatures, and keyboard languages, are not normally required to order a 3276. If codes are not specified, the machine is shipped with the following specifications:

- Power Cable Plug (Japan only): Locking for voltages under 200 volts.
- Power Cable Plug (Canada only): Nonlocking.
- Power Cable Length: 2.8m (9 ft).
- Keyboard Cable Length: 0.9m (3 ft).
- Communication Cable Length: 6.1m (20 ft) for attachment to standalone modem, or to communications facility when an integrated modem is used.
- Loop Station Connector (LSC) cable length: 1.8m (6 ft) for attachment to a direct attached or data link attached loop.

The three digit country code entered on the DPMO will be used to select a power cable plug based on the specification most commonly used in that country. The Character Set Language will be the same as the Keyboard Language. A 3178, 3179, 3180 mdl 1, 3191 mdl A1X, B1X, (Except LAD > A3X, B3X, <) 3192 mdl C1X, C3X, D1X, D3X, 3230, 3262, 3278, 3279, 3268, 3287, 3289, must use the same Character Set Language as the 3276 to which it is attached. The following specify codes must be specified:

- Power (AC, 1-phase): Specify #2998 for an AG-APG country and then select one of the following (except Canada):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800 *
220V #2813	127V #2823
230V #2821	
240V #2801	

\* Includes requirement for 115V.

- Voltage (Canada only): Specify #2800 for 120V/60 Hz.

- **Power Cable Plug** (except Canada and Japan): If the most commonly used power cable plug in the country is not desired, then a country RPQ may be initiated. For details concerning power plugs, refer to "IBM Information Display System Installation Manual - Physical Planning", (GA27-2787).

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ, referenced above, is initiated.

- **Power Cable Plug** (Japan only): For machines requiring 200V and higher, a country RPQ should be initiated for a power plug.

- **Machine Nomenclature:** Specify one of the following:

Canadian	English US #2924
French #2935	Japanese #2930
Brazilian #2933	Spanish
English UK #2927	Speaking #2931

- **Keyboard Language:** For all keyboards, specify one of the following:

Brazilian #2975	International #2950
Canadian/	Japanese
French #2977	English #2955
English #2955	Japanese
EBCDIC #2951	Katakana #2973
English UK #2958	Spanish
English US #2956	Speaking #2969

**Notes:**

1. Japanese English #2955 applies only to Keyboards #4622, #4623, #2715, #2717 and #2718.
2. Japanese Katakana #2973 applies only to Keyboards #2715, #2716, #2717 and #2718.

**Limitations:** All 3178s, 3179s, 3180 mdl 1s, 3278s, 3279s, 6580 Displaywriter System mdls A04, A06, A08, A10, B04, B06, B08, B10 in a 3276 cluster must have the same Keyboard Language as the 3276. Only English US language is valid for 87-key EBCDIC Typewriter/Text Keyboard (#4629).

**Katakana Support:** 127-character (plus space and null) support provided on Keyboards #2715, #2716, #2717 and #2718 is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be 3270 compatible for customers using the NL and EM codes. Customers who do not use the NL and EM codes will be 3274 and 3276 compatible. For details see appropriate SRLs.

The remainder of this Specify Section can be ignored unless special circumstances require a deviation from the standard default values.

- **Power Cable Length:** If the standard 2.8m (9 ft) power cable is not desired, specify #9511 for 1.8m (6 ft) cable or #9513 for a 4.5m (15 ft) cable.
- **Power Cable Plug** (Japan only): Specify #9891 for a nonlocking plug for voltages under 200 volts.
- **Power Cable Plug** (Canada only): Specify #9890 for locking plug.
- **Keyboard Cable Length:** If the standard 0.9m (3 ft) cable is not desired, specify #9399 for 1.8m (6 ft) cable.
- **Communication Cable:** If the standard 6.1m (20 ft) communication cable is not desired, specify #9061 for 3.0m (10 ft) cable, #9062 for 9.1m (30 ft) cable or #9063 for 12.2m (40 ft) cable.
- **Loop Station Connector (LSC) cable:** If the standard 1.8m (6 ft) loop station connector cable is not desired, specify #9405 for 4.3m (14 ft) cable.

## SPECIAL FEATURES

### Non-Communications Features

**Address Keylock (#1009):** Controls access to the unit address switches (Canada only>(and incidentally transmit level switches)<) which are located in the Operator Panel Drawer. Maximum: One. Field Installation: Yes.

**APL/Text Control (#1067):** Provides the control for 3180 mdl 130 (APL only), 3230, 3262 (Text only), 3268, 3276, 3278, 3279, or 3287, with APL/Text feature, 3289 with Text feature 4224 APL Character Set, or 4234 APL/TEXT function. Maximum: One. Field Installation: Yes. Prerequisites: #1068.

**Extended Function Base (#1068):** Allows the addition of APL/Text Control (#1067), or X.21 Adapter For Switched Networks (#5856) and/or Color Display attachment (#1950) feature. Limitations: Cannot be installed with #6315. Maximum: One. Field Installation: RPQ 8K0900 is required.

**APL/Text (#1120):** Provides the capability for display of 222/244/255 character APL/Text set including the 94/116/127 character EBCDIC set. Limitations: This feature is only valid when installed with #1067. This feature is EBCDIC only and is NOT compatible with ASCII. Cannot be installed with #3620. Maximum: One. Field Installation: Yes. Prerequisites: #3610. Corequisite: (#4626) or (#4629). (Text Keyboard (#4629) is only available with keyboard language (#2956), or keyboard (#2718).

**Note:** This feature is available for ordering for field installation until 12/3/82. Then it can no longer be ordered.

**Color Display Attachment (#1950):** Provides the capability of attaching 3279 mdls 2A, 3A, 2B, 3B, 02X, and 03X. For the number of attached terminals, see Terminal Adapter features (#3255, #3256, #3257). Limitations: (1) This feature is not available for 3276 mdl 1. (2) The 3276 does not support Programmed Symbols, Extended Color, or Extended Highlighting. 3279 mdls 2B and 3B are supported on the 3276 for base color and APL/Text operation. Maximum: One. Field Installation: Yes. Prerequisites: (1) #1068 (2) #1067 for use with 3279 mdls 2B, 3B for APL/Text Operation.

**76-Key Jap. Eng./Jap. Kat. T/W KB (#2715):** Typewriter-like layout, movable. 12 PF keys are available in the top row of data keys through use of an alternate shift key. The 76-key Japanese English Typewriter Keyboard provides 49 data keys and 27 control keys. Limitations: Keyboards used on 3178s/ 3179s/ 3180s/ 3275s/ 3277s are not interchangeable with keyboards used on 3276s/ 3278s/ 3279s. Maximum: One Keyboard. Field Installation: Yes. Prerequisites: #2955 or #2973. Customer Setup: Yes.

**76-Key Jap. Kat. Data Entry KB (#2716):** Movable, 4-level shift providing 49 data keys, 10 PF keys and 27 control keys. Limitations: Keyboards used on 3178s/ 3179s/ 3180s/ 3275s/ 3277s are not interchangeable with keyboards used on 3276s/ 3278s/ 3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: #2973. Customer Setup: Yes.

**88-Key Jap. Eng./Jap. Kat. T/W KB (#2717):** Typewriter-like layout, movable, with 49 data keys, 26 control keys and 12 PF keys (total 24 PF keys). 12 of the PF keys are available in the top row of data keys and are available through the use of the alternate shift key. The Japanese Katakana keyboard provides 4-level shift, 49 data keys and 27 control keys. Limitations: Keyboards used on 3178s/3179s/ 3180s/3275s/ 3277s are not interchangeable with keyboards used on 3276s/ 3278s/ 3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: #2955 or #2973. Customer Setup: Yes.

**88-Key Jap. Eng./Jap. Kat. T/W/APL KB (#2718):** An 88-key Japanese English/Japanese Katakana Typewriter Keyboard (see #2717) with modified keytops to allow entry of 81 APL specific characters in addition to the non-APL character set (Japanese English or Japanese Katakana per keyboard language specify). An APL On/Off key controls whether the keyboard is in APL or non-APL character set mode. In contrast to #2717, this keyboard has only 12 PF keys (PF1 through through PF12) which are the group of 12 keys to the right of the main keyboard area. Limitations: Keyboards

used on 3178s/ 3179s/ 3180s/ 3275s/ 3277s are not interchangeable with keyboards used on 3276s/ 3278s/ 3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: #3620 and #2955 or #2973. Customer Setup: Yes.

**Extended Character Set Adapter (#3610):** Provides the additional control and buffering necessary for the extended character set in #1120. Limitations: Cannot be installed with #3620. Maximum: One. Field Installation: No. Prerequisites: #1067. Corequisite: #1120.

**Character Set Extension (#3620):** Provides the capability for display of 222/244/255 character APL/Text including 94/116/127 character EBCDIC set, and the additional control and buffering necessary for the extended APL/Text character set. Limitations: (1) This feature is only valid when installed with #1067. This feature is EBCDIC only and is NOT compatible with ASCII. (2) Cannot be installed with #1120 or #3610. Maximum: One. Field Installation: Yes. Corequisite: #4626 or #4629 Text Keyboard #4629 is only available with #2956, or #2718.

**Encrypt/Decrypt (#3680):** Provides a hardware implementation of the Federal Data Encryption Standard algorithm to encrypt and decrypt data messages under a 56-bit key variable. When used in conjunction with the ACF/VTAM Encrypt/Decrypt Feature (Feature #6010, 5735-RC2) and the IBM Programmed Cryptographic Facility Program Product (5740-XY5), data transmitted over unprotected communication lines can be safeguarded through cryptography. Limitations: 3276 mdls 11-14 only. Maximum: One. Field Installation: Yes.

**Note:** A mercury battery, P/N 1743456 or equivalent, is needed. A battery is shipped with this feature. Replacement of the discharged battery is the customer's responsibility. Discharged battery should be returned to IBM.

**75-Key EBCDIC Typewriter KB (#4621):** Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through use of an alternate shift key. Limitations: Keyboards used on 3178s/3179s/3180s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: Keyboard Language, see "Specify". Customer Setup: Yes.

**75-Key EBCDIC Data Entry KB (#4622):** Movable, with 35 data keys, 10 PF keys and 30 control keys. Limitations: Keyboards used on 3178s/3179s/3180s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: Keyboard Language, see "Specify". Customer Setup: Yes.

**75-Key EBCDIC Data Entry KB (#4623):** Key punch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for high volume data entry. Limitations: Keyboards used on 3178s/3179s/3180s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: Keyboard Language, see "Specify". Customer Setup: Yes.

**87-Key EBCDIC Typewriter/APL KB (#4626):** An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 81 APL specific characters in addition to the 94/116 character EBCDIC set. An APL On/Off key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to #4627, this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Limitations: Keyboards used on 3178s/3179s/3180s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: #3620. Prerequisites: Keyboard Language, see "Specify". Customer Setup: Yes.

**87-Key EBCDIC Typewriter KB (#4627):** Typewriter-like layout, movable, with 49 alphanumeric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of an alternate shift key. Limitations: Keyboards used on 3178s/3179s/3180s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum:

One keyboard. Field Installation: Yes. Prerequisites: Keyboard Language, see "Specify". Customer Setup: Yes.

**87-Key EBCDIC Typewriter/Text KB (#4629):** An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 Text specific characters in addition to the 94/116 character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to #4627, this keyboard has only 12 PF keys (PF 1 through PF 12) which are the group of 12 keys to the right of the main keyboard area. Limitations: Keyboards used on 3178s/3179s/3180s/3275s/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Prerequisites: #3620. Keyboard Language - English US (#2956) only. Customer Setup: Yes. Keyboard Numeric Lock (#4690): Provides keyboards #2715, #2716, #2717, #2718, #4621, #4622, #4623, #4626, #4627, #4629 with the ability to lock the keyboard, if a non-numeric key (other than 0-9, minus, decimal sign, or dup) is operated in a pre-defined numeric-only field. Maximum: One. Field Installation: Yes. Customer Engineering Branch Office for installation. MES number 999999 is to be used for IR (Incident Report) completion data.

**Magnetic Reader Control (#4999):** Provides the capability of attaching a Magnetic Slot Reader which reads encoded information (numeric only) from a magnetic stripe. Maximum: One. Field Installation: Yes.

**SDLC/BSC Switch (#6315):** (Mdl 1-4) Provides SNA/SDLC transmission control in addition to BSC. SDLC or BSC can be selected by the operator with a switch on the operator panel. Limitations: Cannot be installed with #1068. Maximum: One. Field Installation: Yes.

**Selector Light-Pen (#6360):** A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is used for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a new designator character "&". When this designator is used, the Read Modified operation results in the return of both the addresses and the data of all modified fields on the screen. Maximum: One. Field Installation: Yes.

#### Communications Features

**External Modem Interface (#3701):** Provides a CCITT interface and cable for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations. Refer to M2700 pages. Other external non-IBM modems may be attached, subject to the Multiple Supplier Systems Bulletin. Limitations: Cannot be ordered with any other Communications Interface feature. Maximum: One. Field Installation: Yes. Prerequisites: #6301 or #6302. Specify: #9490 for operation on the public switched network (mdls 11-14), or #9491 for operation on nonswitched communications facilities.

**Loop Adapter (#4850):** (Mdl 11-14) Provides the capability to attach to either a direct or data link attached loop of the IBM 8100 System or a 4332/4361 Processor. Limitations: Cannot be ordered with any other Communications Interface feature. Maximum: One. Field Installation: Yes. Prerequisites: #6302.

**1200 bps Integ. Modem, Nonsw (#5500):** Provides an integrated modem for operation over nonswitched communications facilities at speeds of 1200/600 bps. No external modem is required. Limitations: Cannot be ordered with any other Communications Interface feature. Maximum: One. Field Installation: Yes. Prerequisites: #6301. Specify: #9651 for use with 4-wire facility or #9652 for use with 2-wire facility (Japan only) > #2943 if used on NTT D-1 service (<).

**1200 bps Integ. Modem, Sw., Auto Answer (#5501):** (Mdl 11-14) Provides an integrated modem with auto/manual answer capabilities for operation over switched communications facilities at speeds of 1200/600 bps. No external modem is required. Limitations: Cannot be ordered with any other Communications Interface feature. Field Installation: Yes. Prerequisite: #6301.

**Note:** (Except Canada> This feature includes the PSN line plate which is mandatory for attachment to the public switched telephone network.<)

**(Canada only> 1200 bps Integ. Modem, Manual Answer (#5502):** (Mdl 11-14) Provides an integrated modem for communication with a remote processor at speeds of 1200/600 bps over the public switched telephone network. No external modem is required. Limitations: Cannot be ordered with any other Communications Interface feature. Maximum: One. Field Installation: Yes. Prerequisites: #6301.<)

**(Canada only> 1200 bps Integ. Modem, Nonsw With SNBU (#5507):** Provides an integrated modem at speeds of 1200/600 bps for operation over nonswitched communication facilities, and also provides manual switched network backup capability. No external modem is required. Limitations: Cannot be ordered with any other Communications Interface feature. Specify: (#9651) for communication over 4-wire facility, or (#9652) for communication over 2-wire facility. Maximum: One. Field Installation: Yes. Prerequisites: #6301.<)

**1200 bps Integ. Modem, Nonsw With SNBU, Auto Answer (#5508):** Provides an integrated modem for operation over nonswitched communications facilities at speeds of 1200/600 bps and also provides auto/manual answer switched network backup capabilities. No external modem is required. Limitations: Cannot be ordered with any other Communications Interface feature. Field Installation: Yes. Prerequisites: #6301. Specify: #9651 for communications over 4-wire facility, or #9652 for communications over 2-wire facility.

**Note:** (Except Canada> This feature includes the PSN line plate which is mandatory for attachment to the public switched telephone network.<)

**(Except Canada> X.21 Adapter For Nonsw Networks (#5655):** (Mdl 11-14) Provides an interface and cable for attachment to the X.21 Nonswitched data circuit-terminating equipment (DCE). See "Specify" for length of communication cable, which is supplied. SDLC data transmission at speeds of 2400 bps (#9822), 4800 bps (#9823), and 9600 bps (#9825) are supported. Limitations: Cannot be ordered with any other Communications Interface feature. Maximum: One. Field Installation: Yes. Prerequisites: #6302.<)

**(Except Canada> X.21 Adapter For SW Networks (#5656):** (Mdl 11-14) Provides an interface for attachment to the X.21 switched network to transmit data at speeds of 2400 bps, 4800 bps, and 9600 bps. The X.21 interface is a recommendation from the CCITT to standardize the interface between the DTE and DCE for synchronous operation, and will be used in place of the V.24/V.28 interface. A keyfront decal and a label on the keyboard will be provided for easy operator reference in using this feature. Limitations: Cannot be ordered with any other Communications Interface feature. Maximum: One Field Installation: Yes. Prerequisites: (1) #1068. (2) #6302.<)

**Comm. Feature With Business Machine Clock (#6301):** Required for attachment to communications facilities through any 1200 bps Integrated Modem, or #3701 at 1200 bps, to any external modem that does not provide its own clocking. Limitations: Cannot be ordered with #6302. Maximum: One. Field Installation: Yes.

**Comm. Feature Without Business Machine Clock (#6302):** Required for attachment to communications facilities, at speeds of up to 9600 bps using SDLC, or up to 7200 bps using BSC, through #3701 and any external modem that provides its own clocking, or through #5656, or through #5655 and its data circuit-terminating equipment. It is also required for attachment of the 3276 mdls 11-14 to a direct or data link attached loop of the 8100 System, at a speed of 9600 or 2400 bps respectively. Limitations: Cannot be ordered with #6301. Maximum: One. Field Installation: Yes.

#### Terminal Adapters

**Terminal Adapter No. 1 (#3255):** Enables attachment of two terminals (3178s, 3179s, 3180 mdl 1s, 3191 mdl A1X, B1X,(Except LAD> A3X, B3X<) 3192 mdl C1X, C3X, D1X, D3X, (Canada only> 3230s,<) 3262s, 3268s, 3278s, 3279s, 3287s, 3289s, 4224 mdl 2XXs, or 4234 mdl 1s, in any combination). Limitations: See "Attachment Matrix" be-

low for permissible 3178 attachments and 3278 and 3279 mdl restrictions. Maximum: One. Field Installation: Yes.

**Terminal Adapter No. 2 (#3256):** Enables attachment of two terminals (3178s, 3179s, 3180 mdl 1s, 3191 mdl A1X, B1X,(Except LAD> A3X, B3X<) 3192 mdl C1X, C3X, D1X, D3X, (Canada only> 3230s,<) 3262s, 3268s, 3278s, 3279s, 3287s, 3289s, 4224 mdl 2XXs, or 4234 mdl 1s, in any combination). Limitations: See "Attachment Matrix" below for permissible 3178 attachments and 3278 and 3279 mdl restrictions. Maximum: One. Field Installation: Yes. Prerequisites: #3255.

**Terminal Adapter No. 3 (#3257):** Enables attachment of two terminals(3178s, 3179s 3180 mdl 1s, 3191 mdl A1X, B1X,(Except LAD> A3X, B3X<) 3192 mdl C1X, C3X, D1X, D3X, (Canada only> 3230s,<) 3262s, 3268s, 3278s, 3279s, 3287s, 3289s, 4224 mdl 2XXs, or 4234 mdl 1s, in any combination). Limitations: See "Attachment Matrix" below for permissible 3178 attachments and 3278 and 3279 mdl restrictions. Maximum: One. Field Installation: Yes. Prerequisites: #3256.

#### 3178/3179/3180/3191/3192/3276/3278/3279 ATTACHMENT MATRIX

Mdl	Mdl					
3276	3178	3278	.....	.....	.....	.....
	1	2	3	4	5	
1	No	Yes	No	No	No	No
11	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	No	No	No
12	Yes	Yes	Yes	Yes	Yes	No
3	Yes	Yes	Yes	Yes	No	No
13	Yes	Yes	Yes	Yes	Yes	No
4	Yes	Yes	Yes	Yes	Yes	No
14	Yes	Yes	Yes	Yes	Yes	No

Mdl	Mdl			
3276	3279	.....	.....	.....
	2A	3A	2B	3B
1	No	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	No	Yes	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

Mdl	Mdl	
3276	3279	.....
	02X	03X

1	No	No
11	Yes	Yes
2	Yes	Yes
12	Yes	Yes
3	Yes	Yes
13	Yes	Yes
4	Yes	Yes
14	Yes	Yes

Mdl	Mdl	1*
3276	3179	3180

1	No	No
11	Yes	Yes
2	Yes	Yes
12	Yes	Yes
3	Yes	Yes
13	Yes	Yes
4	Yes	Yes
14	Yes	Yes

(Except LAD>  
A3X/B3X<)

Mdl	Mdl
3276	3192
	C1X/C3X
	D1X/D3X***
1	No
11	Yes
2	Yes
12	Yes
3	Yes
13	Yes
4	Yes
14	Yes

Notes:

- 3276 mdls 1-3 with #6315 in SDLC mode, will support the same 3278 mdls as the 3276 mdls 11-13 respectively.
- A 3276 with #6315 installed, does not support attachment of the 3279.
- 6580 mdls A04, A06, and A10 provide 3278-2 emulation support and 6580 mdls B04, B06, B08, and B10 provide 3278-4 emulation support. Find the appropriate 3278 mdl to determine the 3276 mdl requirements in the above matrix.
- The 3276 provides a display and a port for attaching one terminal: a 3178, 3179, 3180 mdl 1, (Canada only > 3230, <) 3262, 3268, 3278, 3279, 3287, 3289, 4224 mdl 2XX, or 4234 mdl 1. The 3276 with the three Terminal Adapters (#3255, #3256, #3257) thus allows a maximum cluster size of eight displays or printers.

\* The 3276 supports the 3180 mdl 1 only when the 3180 is emulating a 3278 mdl 2-4. The 3276 does not support the 3180 extended functions or the 27x132 character screen format.

\*\*The 3276 supports the 3191 A1X/B1X, (Except LAD> A3X/B3X<) when the 3191 is emulating a 3278 mdl 2.

\*\*\* The 3276 supports the 3192 C1X/C3X/D1X/D3X when the 3192 is emulating a 3278 Model 2.

## MODEL CONVERSIONS

Model changes are field installable as follows:

From/ To	002	003	004	011	012	013	014
001	x	x	x	x	x	x	x
002		x	x		x	x	x
003			x			x	x
004							x
011					x	x	x
012						x	x
013							x

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling

System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

The following items are available on a purchase only basis. For shipment with machine, order the Feature Number as shown below.

Item	Feature Number	Max Qty
Magnetic Slot Reader	#9441	*
Magnetic Reader Extension Cable:		
6m (20 ft)	#9106	**
12m (40 ft)	#9107	**

\* A maximum of one Magnetic Slot Reader may be ordered.

\*\* A maximum of one extension cable may be ordered.

**Magnetic Slot Reader (#9441, P/N 4123500):** A free-standing Magnetic Slot Reader (MSR) that reads encoded information from a magnetic stripe. It attaches by a 1.5m cable through the Magnetic Reader Control (#4999). The MSR has three lights and a buzzer which provide feedback to the user on the status of the read data. The MSR accommodates a wide range (height and length) of magnetic striped plastic cards such as: ID badges, security operator identification cards, etc. Using the 3275/3277 like 10-numeric character set, the maximum number of data characters that can be read are 7 to 37 characters at 75 bpi or 210 bpi, and 7 to 118 characters at 127 bpi. A minimum of seven characters must be encoded between the start sentinel and end sentinel characters.

The following cable assemblies can be used to extend the Magnetic Slot Reader distance. Limitations: Extension Cables cannot be plugged into other extension cables.

Item	Feature Number	P/N
6m (20 ft)	#9106	4832986
12m (40 ft)	#9107	4832987

A variety of magnetic documents, tags, and labels the MSR can read, may be obtained from NDD, some of which, depending on length, can be encoded by devices such as the IBM 3642 Encoder Printer.

For complete information on the availability of pre-encoded magnetic striped plastic cards, contact a

One of the following MSR/MHS Customer Service Manuals should be ordered when ordering by MES for field installation:

Language	Order Number
English	GA24 - 3663
French	GA11 - 0007
Japanese	NGA24 - 3663
Spanish	GA10 - 8101

**Note:** All other countries should order English translation.

**Note:** Magnetic cards coded with the Alternate End of Message character (hexadecimal "C") cannot be read by this reader. SSCP-LU communication for MSR is not supported, when the MSR is attached to a 3276 or a 3278 which is attached to a 3276.

Limitations: Valid for numeric-only data encoded according to the American National Standard entitled "Magnetic Strip Encoding for Credit Cards, ANSI X4.16 - 1973" when the MSR is attached to a 3276 or to a 3278 which is attached to a 3276. Field Installation: Yes. Prerequisites: #4999.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventive maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking ... for 50 readers, 2 spares ... for 100, 3 ... for 150, 4 ... for 200, 5.

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. Authorization Form #2110 applies.

**Magnetic Reader Extension Cables:** These cable assemblies can be used to extend the Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List. MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. Limitations: Extension cables cannot be plugged into other extension cables.

Item	Feature Number	P/N
6m (20 ft)	#9106	4832986
12m (40 ft)	#9107	4832987

Magnetic Reader Replacement Assemblies		
Description		P/N
MHS Amplifier Card and Cable Assembly		4832727
MSR Arm and Sensor Head Assembly		4832963
MSR Base and Feedback Assembly		4832973
MSR Amplifier Card and Cable Assembly		4832962
MSR Cover		4832964

The following tables list the number of Magnetic Reader replacement assemblies which the customer may want to consider stocking.

Magnetic Slot Reader		
Number of MSRs	Arm & Sensor Head Assembly	Base and Feedback Assembly
P/N 4123500	P/N 4832963	P/N 4832973
50	2	1
100	3	1
150	4	1
200	5	2

Number of MSRs	Amplifier Card and Cord Assem P/N 4832962	Cover P/N 4832964
P/N 4123500		
50	2	1
100	3	1
150	4	1
200	5	1

**Warranty:** Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**Display Station Keyboard Accessories:** The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3276 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

(Canada only) > These accessories should be bulk ordered by P/N on a P&SR from the plant of manufacture. Individual customer requirements should be satisfied from local country stock. <)

**Legendable Keytop:** The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	P/N
White	5188775
Charcoal Gray	8627192
Light Gray	8542831

**Blank Keytop:** The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

Blank Keytops:	P/N
White	1853775
Charcoal Gray	1853567
Light Gray	1853563

**Keytop Extractor (P/N 9900373):** The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled off its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

**Battery, Mercury (P/N 1743456):** To provide power to sustain the master key of Encrypt/Decrypt (#3680) when normal power is not present. A 4.14 volt non-rechargeable mercury battery. This supply item has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal service. Additional or replacement batteries can be ordered through IBM. Limitations: Can be installed on 3276 mdls 11-14 only. Field Installation: Yes. Prerequisites: #3680. Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

**Keys (P/N 2577741):** The 3276 with Security Keylock (#6340) is shipped with two keys. Additional keys may be purchased only from IBM. Vendor will supply additional keys only to original purchaser. A letter of authorization, with key identification (on customer metal tag), must accompany each order. Allow two to three weeks for delivery.

SUPPLIES (NONE)

## 3277 DISPLAY STATION

*The 3277 Model 1 is no longer available*

### PURPOSE

A high-performance, cathode-ray tube unit used in clusters with the 3271, 3272, or 3274 Control Unit, or Local Display Adapter (System/3 model 8 or 12), or Display Adapter (System/3 model 15), for displaying alphanumeric data, and for entering data into and retrieving data from a System/3, S/360, or S/370, 30XX Processor, 4300 Processor, 8100 System, or 3790 Communication System. A keyboard or light-pen or both permit an operator to display and manipulate data on the screen in a highly flexible and efficient manner. With its comprehensive and powerful set of standard and optional features, the 3277 Display Station meets both general purpose and unique display requirements.

### MODELS

**Model 2 002** For use with the 3271 model 2 or 12, 3272 model 2, 3274 model 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, operator display on System/3 model 4, the Local Display Adapter (#4702 and #4705 on the System/3 Models 8 or 12) to display up to 1,920 characters ... 24 lines of 80 characters each. For use with 3790 or 8100, see below.

**Maximum:** Up to 32 3277s can be attached to a 3271 or 3272. Up to 16 3277s can be attached to a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A or 31D. Up to four 3277s can be attached to a 3274 mdl 51C. The maximum is reduced by one on a 3271 or 3272 for each 3284-1,2, or 3286-1,2 or 3287, or 3288-2 Printer attached. The maximum is reduced by one on a 3274 for each 3284-1,2 or 3286-1,2 or 3287 or 3288-2 or 3289 Printer attached. See M3271, 3272 or 3274 pages. Up to 24 3277 mdls 1 or 2 can be attached to the 8101 on a system. This maximum is reduced by one for each 3284, 3286, or 3288 attached to the 8101. See M8101 pages.

**Prerequisites:** A 3271 mdl 2 or 12, 3272 mdl 2, 3274 with Type B Terminal Adapters, or an 8101 with #1505 or #1506. See M3271, 3272, 3274 or 8101 pages. 3277 Displays attached to the 3791 Controller must have keyboards.

### HIGHLIGHTS

The 3277 displays 63 9X12 dot matrix high-quality characters (36 alphameric, 27 special characters, including the space). The 3277 features Data-Field Organization which permits individual fields of data on the screen to be program-defined with various attributes, such as: Protected or unprotected, alphameric or numeric-only, normal intensity, non-displayed, or brightened intensity, and selector light-pen detection - allowed or disallowed.

**Editing Features:** Typamatic cursor, tab, back-tab, protected data, insert and delete, and extended-erase (erase to end of field, erase all keyboard input data, erase entire screen) are standard features for displays equipped with a keyboard.

**Input Flexibility:** A choice of keyboards, a selector light-pen, a set of Program Function (PF) keys provide unmatched input flexibility. See "Special Features" below.

**Output Flexibility:** Information on the screen can be directed to another display or hard copy device under program control.

**Security Enhancement Features:** An Operator Identification Card Reader (optional) is provided to enter system user identification. This enhances the (programmed) control of the operator's access to data and audits his actions. It may also be used to enter any sequence of characters (pre-recorded on a card) for other purposes, such as transaction control and account identification. A special Non-Displayed Keying Mode (standard) provides for fields of data to be program-defined so they will accept security data entered from the keyboard without displaying the data on the screen. A Security Key lock (optional) provides a lock and key which prevents modification of data on the display if the key is in the "On" position. The data is not visible on the screen.

**For Operator Display on System/3 Mdl 4:** A 3277 mdl 1 (without keyboard) is required on the System/3 mdl 4. It functions as the operator display for the Communications Control Program (CCP). A 3271 or 3272 is not required. No cable order is required.

**For Local Work Stations on System/3 Mdl 4:** Up to five 3277s (mdls 1 and 2 intermixed) can be directly attached to the 5404 Processing Unit. A 3271 or 3272 Control Unit is not required. A cable is required. All 3277 "Special Features" apply. See "Specify" below for voltage and cable ordering information.

**For Local Display Adapter on System/3 Mdls 8 or 12:** Up to 12 3277s (mdls 1 and 2 intermixed) can be directly attached to the Local Display Adapter (#4702) with appropriate subfeatures on the 5408 or 5412. This maximum is reduced by one for each 3284 (mdl 1 or 2), 3286 (mdl 1 or 2), 3287 (mdl 1 or 2) or 3288 (mdl 2) Printer that is attached. A 3271 or 3272 Control Unit is not required. A cable is required. All 3277 "Special Features" apply with the exception of ASCII keyboards and character sets. Specify #9089 for EBCDIC Character Set. See "Specify" for voltage and cable ordering information.

**For Operator Console on System/3 Mdl 15:** A 3277 mdl 1 is required on the System/3 mdl 15. It functions as an operator console and must be equipped with 78-key Operator Console Keyboard (#4632). For Character Generator Keyboard Language and nomenclature as well as complete ordering instructions for System/3 mdl 15 console, see M5415 pages "Console Ordering Instructions".

**For Display Adapter on System/3 Mdl 15:** Up to 30 3277s (mdls 1 and 2 intermixed) can be directly attached to the Display Adapter (#4601/#4602) on the 5415. The maximum is reduced by one for each 3284, 3286, 3287, or 3288 printer that is attached. A 3271 and 3272 is not required. A cable order is required. See "Specify" for voltage and cable ordering information. All 3277 special features apply.

**For use with 3790 Communication System:** For special features that are supported, see M3791 pages. A 3271 or 3272 or 3274 is not required when the 3277 mdl 2 is attached to the 3791. For character set, specify #9089. For power, see "Specify". For cables, see M3791 pages.

**For use with 8100 System:** For special features that are supported, see the M8100 pages. A 3271 or 3272 is not required when the 3277 mdl 2 is attached to the 8101 with feature #1505 or #1506. For Character Set, specify #9089. For power, see "Specify". For cables, see M8100 pages. Host programs written for the 3270 are not supported by the 8100 System.

**Bibliography:** See *KWIC Index*, G320-1621, or specific system bibliography.

### SPECIFY

#### \* Power (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	208V #9902
220V #2813	230V #9904
235V #2814	

For Japan only, specify #9890 for locking plug or #9891 for nonlocking plug for voltages under 200 volts.

- Cables: See "Accessories" for cable ordering instructions. Refer to 3270 *Installation Manual-Physical Planning*, GA27-2787.

- Machine Nomenclature: [plant installation only]

English US #2750	Japanese #2930
French #2928	Spanish #2931
German #2929	Italian #2932

- Character Generator Language: Select one of the following unless the Katakana Character Generator or the Data Analysis - APL Feature (which is in dual-case English US only) is ordered. See "Special Features". If Dual Case Character Set is required, refer to RPO listing:

#2705 French Mono Case  
#2709 French Dual Case  
#2704 German Mono Case  
#2705 Italian Mono Case  
#2702 Italian Dual Case  
#2714 Spanish Speaking Mono Case  
#2705 United States English Mono Case

- Keyboard Language: When ordering Keyboard #4630, #4631, #4633, or #4636, also specify one of the following:

English US #2956	French #2964
German #2957	Italian #2968
Spanish Speaking #2961	

**Maximum:** One per 3277. **Limitations:** For Keyboard #4632 when used as Operator Console, specify #2956.

**3277 Display Station (cont'd)**
**SPECIAL FEATURES**

**Data Analysis - APL Feature (#1066):** [3277 mdl 2] Provides dual case EBCDIC, the APL set, and (for output only) 120 TN print train (see Type Catalog, S/370 Printers) characters. 93 TN characters are input and output both, 27 are output only. **Limitations:** Mutually exclusive with #2706. **Field Installation:** Yes. **Prerequisites:** #1066 on 3271 or 3272.

**Audible Alarm (#1090):** An alarm, sounded under program control, to alert the operator to a special condition during keyboard operation when a character is entered into the next-to-last position on the screen. **Maximum:** One. **Field Installation:** Yes.

**Katakana Character Generator (#2706):** Provides the ability to display the characters described on the Katakana Keyboard. Will not function on units with #1066 installed. **Limitations:** Mutually exclusive with #1066. **Field Installation:** Yes. **Prerequisites:** #2707 on 3271, 3272, 5408 or 5412.

**Katakana Typewriter KB (#2955):** Typewriter-like layout, movable, 4-level shift providing 55 Katakana, 36 alphameric, 33 special characters, and 12 PF keys. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** #2706 ... #2707 on 3271 or 3272. **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**Katakana Data Entry KB (#2973):** Movable, 4-level shift providing 55 Katakana, 36 alphameric and 33 special characters. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** #2706 ... #2707 on 3271 or 3272. **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**66-Key EBCDIC Typewriter KB (#4630):** Typewriter-like layout, movable, with 45 alphameric keys and 21 control keys. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** Keyboard Language. See "Specify". **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**66-Key EBCDIC Data Entry KB (#4631):** Movable, with 36 alphameric keys and 30 control keys. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** Keyboard Language. See "Specify". **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**78-Key Operator Console KB (#4632):** Operator-console layout, movable, with 45 alphameric keys, 21 control keys, and 12 PF keys. **Field Installation:** Yes. **Maximum:** One. **Note:** Available only in English US except when used on a 5415 console. See M5415 pages. **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**78-Key EBCDIC Typewriter KB (#4633):** 66-key EBCDIC typewriter layout, movable, with 12 additional PF keys. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** Keyboard Language. See "Specify". **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**66-Key EBCDIC DE KB with Key Punch Layout (#4636):** Movable with 36 alphameric keys and 30 control keys. **Field Installation:** Yes. **Maximum:** One. **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**66-Key EBCDIC Typewriter/APL KB (#4637):** Movable, with 45 alphameric and 21 control keys. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** #1066. **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**78-Key EBCDIC Typewriter/APL KB (#4638):** Movable with 45 alphameric keys, 21 control keys and 12 program keys. **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** #1066. **Note:** Keyboards or selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**78-Key EBCDIC Fast Cursor Text KB (#4639):** With 45 alphanumeric keys, 21 control keys and 12 program keys. The speed of the Cursor and typamatic key operation is approximately twice that of a non-Text keyboard. Includes typamatic Delete and a function similar to typewriter carriage return and 12 program keys. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1066 on 3277 mdl2 as well as on a control unit (3271 mdl 2 or 3272 mdl 2). **Note:** Keyboards or

selector light-pens used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines.

**Operator Identification Card Reader (#4600):** Provides the capability of reading 53.9mm x 85.7mm (2-1/8 inches x 3-3/8 inches) plastic data processing card with an encoded magnetic stripe. Using the 10-numeric character set, the number of characters that can be read is 1-37 characters at 75 bpi (bits per inch).

#4600 provides 1) the ability to read an operator identification card to allow identification of the display operator, thus enhancing system data security capability and 2) the ability to read the magnetic stripe credit card (53.9mm x 85.7mm).

For complete information on the availability of pre-encoded magnetic striped plastic data processing cards, contact IBM. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Any keyboard.

**Keyboard Numeric Lock (#4690):** Provides the ability to lock the keyboard, if a non-numeric key, other than 0-9, minus, period, or DUP, is depressed in a predefined numeric-only field. **Field Installation:** Yes. Contact local Customer Engineering Branch Office for installation.

**Security Key Lock (#6340):** A lock and key prevent modification of data on the display if the key is in the "Off" position. Data is not visible on the screen. **Maximum:** One. **Field Installation:** Yes.

**Selector Light-Pen (#6350):** A hand-held, pen-like device that permits the display operator to select fields of data from a display for computer input. **Maximum:** One. **Field Installation:** Yes.

**MODEL CONVERSIONS (None)**
**ACCESSORIES**

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable -** For proper identification, installation, and application of cable and associated accessories, refer to *IBM Cabling System - Planning and Installation Guide*, GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

**Coaxial cable -** For proper identification, installation, and application of cable and associated accessories, refer to *IBM 3270 Installation Manual - Physical Planning*, GA27-2787, and *Coaxial Cable and Associated Manual*, GA27-2805.

Item	Number	Description
Assm	2577672	Cable Assembly In-Door
Bulk	0323921	Coax Wire (Note 1)
P/N	1836418	Connector Kit (Note 1)
Assm	1833108	Cable Assembly Out-Door
Bulk	5252750	Coax Wire (Note 2)
P/N	1836419	Connector Kit (Note 2)
P/N	1833104	Station Protector Kit, Carbon (Note 4)
P/N	2621414	Modification Kit (Note 3)
P/N	1833106	Station Protector Attachment Kit (Note 5)
P/N	5252772	Station Protector Element Carbon (Note 6)
P/N	5252643	Adapter (Note 7)
P/N	1830818	Station Protection Kit, Gas (Note 4)
P/N	5252899	Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

**Notes:**

- Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
- Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
- Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.

### 3277 Display Station (cont'd)

4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two #2577672 or two #1833108 cable assemblies together.

**Keys (P/N 2577741):** The 3277 with Security Keylock #6340 special feature is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser). Order MES from Kingston. A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

**3277 Display Station Keyboard Accessories:** The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3277 Display Station keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor. These accessories may be ordered by P/N via (Canada only+ a DP Supply Order from the Raleigh plant. +)

(Canada only+ These accessories should be bulk ordered by P/N on a P&SR from the plant of manufacture. Individual customer requirements should be satisfied from local country stock. +)

**Legendable Keytop:** The legendable keytop consists of two parts: A molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key)

Legendable Keytops:	P/N
White	5188775
Charcoal Gray	8627192
Light Gray	8542831

**Blank Keytop:** The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key)

Blank Keytops:	P/N
White	1853775
Charcoal Gray	1853567
Light Gray	1853563

**Keytop Extractor (P/N 9900373):** The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

**SUPPLIES (None)**

## 3278 DISPLAY STATION MODELS 1 - 5

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

A cathode-ray tube (CRT) display station used in clusters with the 3274 or the 3276 for displaying alphanumeric data, and for entering data into and retrieving data from a System/3, S/360, S/370, 4300 Processor, 3081 Processor, 3090 Processor, 9370 Processor, 3790 Communication System, 3814 Switching Management System, or 8100 System. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner. With its set of basic and optional features, the 3278 meets both general-purpose and unique display requirements.

### MODELS 1 - 5

**Model 1 001:** For use with 3274 or 3276 to display up to 960 characters --- 12 lines of 80 characters each.

**Model 2 002:** For use with 3274 or 3276 or to attach directly to the 3082 Processor Controllers, or to attach to the 4331 Processor, via the Standard Display/Printer Adapter or optional Display/Printer Adapter Expansion, or to attach to the 3814 model A Switching Management System with the Display/Printer Attachment Feature, or to attach to a 3601, 3602, or 4701 Finance Communication Controller via the Device Cluster Adapter. Displays up to 1,920 characters --- 24 lines of 80 characters each.

**Model 3 003:** For use with 3274 or 3276 to display up to 2,560 characters --- 32 lines of 80 characters each.

**Model 4 004:** For use with 3274 or 3276 to display up to 3,440 characters --- 43 lines of 80 characters each.

**Model 5 005:** For use with 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C to display up to 3,564 characters --- 27 lines of 132 characters each.

For use with a 3790 Communication System: The 3791 Controller only supports the 3278 mdl 2. See the "3791 Configurator", GA19-0111, for additional details. For use with an 8100 System: See the "System Configurator", GA27-2876.

**Prerequisites:** 3278 needs a 3274, 3276, or 4331 with appropriate Terminal Adapter, or a 3814 Switching Management System with the Display/Printer Attachment Feature. The 3278 mdl 5 requires Configuration Support B #9111, C #9112, D #9124, or T #9113 on the 3274 to which it is attached --- See M3274, 3276, or 4331 pages. When attached to the 3790 Communication System or the 8100 System via the 3276, all 3278s must have a keyboard. When the 3278 mdl 2 is attached to a 3814 mdl A, one of the following keyboards is required: #4627 (preferred), #4621, #4622, or #4623. The following feature is optional: #4690. All other 3278 mdl 2 special features are not supported.

**Customer Setup (CSU):** The 3278 is designated Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

Displays a character within a 7x14 character matrix in 960, 1,920 and 2,560-character mdls; within a 7x12 character matrix in the 3,440 and 3,564-character mdl. The basic 26-character upper case letters are presented in a 7x9 character matrix for the 960, 1,920 and 2,560-character mdls, and in a 7x8 character matrix for the 3,440 and 3,564 character-mdl. Displays a 94-character set: 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters. A monospace switch provides the capability of switching

to uppercase alphanumeric mode for 3277 compatibility. Uses 3270 field formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as protected/ unprotected, alphanumeric, normal/intensified, displayable/non-displayable, and selector light-pen detection allowed/disallowed.

Extensions to the 3270 data stream supported by appropriate 3274 and 3278 features, provide the following field and character attributes:

- Extended highlighting -- blink, reverse video or underscore.
- Programmed Symbols (PS) -- user-defined symbols.

Special keyboards are provided to allow operator selection of these attributes.

The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of a 3278. When the 3278 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user written host application program, or,
2. A customer definable matrix loaded from the system diskette at IML time. For further details, see the "IBM 3270 Information Display System Planning and Setup Guide", GA27-2827.

When the 3278 is attached to a 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276. (The host can perform a copy in a manner compatible with existing 3271/3272 support.)

**Operator Factors:** The 3278 has an anti-glare screen. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Display of data on the screen is accomplished without refresh interrupt (i.e., no blinking, except that transient patterns are displayed when data is being loaded to the PS buffers). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes.

**Editing Functions:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphanumeric, special symbol, and cursor move keys have typamatic capability. Double speed cursor typamatic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the selector light-pen function. Fields of data may be selected by positioning the cursor and then using the cursor select key.

**Input Flexibility:** A choice of keyboards or the selector light-pen provide input flexibility. A Magnetic Slot Reader (optional) and, for 3278s attached to a 3274, a Magnetic Hand Scanner (optional) provide for the input of magnetically encoded data --- see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys are basic with all typewriter keyboards.

When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, wordwrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 pages for languages supported. Entry Assists supported for mdls 2-5 in mdl 2 mode only. See "Accessories" for 3274 Entry Assist keytop kits.

**Security Functions:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A security keylock prevents modification or display of data in the display terminal unless the key is turned to the "on" position. These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions. A Magnetic Slot Reader (optional) and, for 3278s attached to a 3274, a Magnetic Hand Scanner (optional) are available to enter system user identification.

**Audible Alarm:** An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone. Maximum: One. Field Installation: Yes.

When attached to a 4331 Processor via the standard Display/ Printer Adapter or optional Display/ Printer Adapter Expansion, functional support varies from that of the 3278-2 attached to a 3274 or 3276. See M4331 pages for details of support.

**Keyboards:** Refer to Type Catalog for a picture of the keyboard layouts. Keyboards are provided with a standard 0.9m (3 ft) attachment cable. The keyboard language must be specified. See "Specify" for options.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the Problem Determination Guide manual that will be stored under the keyboard palm rest. Also, see "Customer Responsibilities".

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 3278.
3. Physical setup, connection of cables in customer access areas, switch settings and check out.
4. Contacting Customer Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
5. Notifying IBM of intent to relocate and follow IBM instructions for relocation.
6. Use of the following problem determination procedures and fill out trouble report prior to calling for IBM service.
7. Disconnecting, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

**Publications:** See "KWIC Index", G320-1621, or specific system bibliography.

### Basic Configuration

Specify codes are not normally required to order a 3278. The 3-digit Country Code entered on the DPMO sheet will be used to select (default) the Country variables (power, power cable plug, machine nomenclature, and keyboard language) based on the specification most commonly used in that country. If not specified otherwise, all mdls of the machine are shipped with the following:

- Power (AC, 1-phase)

Country	Voltage
Argentina	220V/50 Hz
Australia	240V/50 Hz
Brazil	110V/60 Hz

Canada	120V/60 Hz
Chile	220V/50 Hz
Mexico	120V/60 Hz
New Zealand	230V/50 Hz
Venezuela	120V/60 Hz

All others must specify.

- Power Cable Plug (Japan only): Locking plug for voltages under 200 volts.
- Power Cable Plug (Canada only): Nonlocking plug.
- Power Cable Length: 2.8m (9 ft).
- Keyboard Cable Length: 0.9m (3 ft).
- Keyboard Language and Nomenclature: The following defaults are assumed:

Country	Nomenclature	Language
Argentina	Spanish Speaking	Spanish Speaking
Brazil	Brazilian	Brazilian
Canada	English	English US
Japan	English	Specify Device Code
Mexico	Spanish Speaking	Spanish Speaking
Venezuela	Spanish Speaking	Spanish Speaking
All Others	English	English US

### SPECIFY

#### Mandatory Specified

- #2998 - AG-A/PG machine code.
- Other than any mandatory specify code above, the Specify section can be ignored unless the options provided in the "Basic Configuration" above do not meet your needs.
- Power: (AC, 1-phase). If power different than the one provided for "Basic Configuration" default is required, specify one of the following: (Not all voltages apply to all countries.)

(Except Canada>

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800*
220V #2813	127V #2823
230V #2821	
240V #2801	

\*Includes requirement for 115V.<)

- Keyboard Language: For all countries, if a keyboard language different than the one provided by "Basic Configuration" default is required, except for #4629, which is available in English US only.

Brazilian	#2975	Int'l	#2950
Canadian/Fr	#2977	Japan Eng.	#2955*
EBCDIC	#2951	Japan Kat.	#2973**
English US	#2956	Span Speak	#2969
English UK	#2958		

\* Japanese English #2955 applies only to Keyboards #4622, #4623, #2715, #2717, #2718, #2719, #2708, and #2721.

\*\* Japanese Katakana #2973 applies only to Keyboards #2715, #2716, #2717, #2718, #2719, #2708 and #2721.

Limitations: All 3278s attached to a 3274 or 3276 must have the same keyboard language that is selected during 3274 customization or is specified for the 3278.

- **Katakana Support:** 127-character (plus space and null) support provided on keyboards #2715, #2716, #2717, #2718, #2719, #2708 and #2721 is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be 3270 compatible for customers using the NL and EM codes. Customers who do not use the NL and EM codes will be 3274 and 3276 compatible. For details see appropriate SRLs.

- **(Except Canada and Japan > Power Cable Plug:** If the most commonly used power cable plug in the country is not desired, then a country RPQ may be initiated. For details concerning power plugs, refer to "Information Display System Installation Manual - Physical Planning," GA27-2787.

**Note:** If a power supply, not the most common is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated. <

- **Power Cord Plug (Japan only):** For units requiring 200V or higher, a country RPQ should be initiated for a power plug.
- **Power Cable Plug (Japan only):** Specify #9891 for a nonlocking plug for voltages under 200V.
- **(Canada only > Power Plug:** Specify #9890 for a locking plug. <)
- **Keyboard Cable Length:** If the standard 0.9m (3 ft) Keyboard cable is not desired, specify #9399 for a 1.8m (6 ft) cable. Limitations: This feature is not available for Keyboards #2708, #2719, #2721, #4640, #4651, or #4652.
- **Power Cable Length:** If the standard 2.8m (9 ft) power cable is not desired, specify (Canada only > #9511 for a 1.8m (6 ft) cable, or <) #9513 for a 4.5m (15 ft) cable.
- **Terminal Cables:** See "Accessories" for ordering instructions. For cable specifications, see "3270 Installation Manual - Physical Planning", GA27-2787.
- **(Japan only > Character Set Language:** Specify the following if Japanese Katakana is required: #2773 <)
- **3814 mdl A Attachment:** Specify #9615 to attach 3278 mdl 2 to a 3814 mdl A.

## SPECIAL FEATURES

**Note:** 3274 mdls 21, 31A, 31C or 51C may not support all desired 3278 special features. Before ordering any of the following special features, check the 3274 to assure that adequate storage is available. Not all of the following special features are supported by 3278-2s attached to the 4331 system via the standard Display/Printer Adapter or the Display/Printer Adapter Expansion. See M4331 pages for a list of supported special features.

**88-Key Attribute Select Japanese/Japanese Katakana Typewriter Keyboard (#2708):** Overlay and Attribute Select keyboards are equipped with PS, highlight and color select function keys. They provide operator selection for data entry, under program control, of PS and highlighting attributes when attached to 3278s equipped with PS features. The desired PS and highlights can be selected by the operator through use of the appropriate PF keys (13-24) in upper case and alternate shift on this keyboard. Except for color marking and annotation on the 12 PF keys on the right hand side of the keyboard, these keyboards appear identical to their equivalent non-Overlay and non-Attribute Select keyboards. Prerequisites: #2955 or #2973. Limitations: Cannot be installed on a 3278 attached to a 3276. Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**76-Key Japanese English/Japanese Katakana Typewriter Keyboard (#2715):** Typewriter-like layout, movable. Twelve PF keys are available in the top row of data keys through use of an alternate shift key. This keyboard provides 49 data keys and 27 control keys. Prerequisites: #2955 or #2973. Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**76-Key Japanese Katakana Data Entry Keyboard (#2716):** Movable, 4-level shift providing 49 data keys, 10 PF keys and 27 control keys. Prerequisites: #2973. Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**88-Key Japanese English/Japanese Katakana Typewriter Keyboard (#2717):** Typewriter-like layout, movable, with 49 data keys, 26 control keys and twelve PF keys (24 total PF keys). Twelve of the PF keys are available in the top row of data keys and are available through the use of the alternate shift key. This keyboard provides 4-level shift, 49 data keys and 27 control keys. Prerequisites: #2955 or #2973. Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**88-Key Japanese English/Japanese Katakana Typewriter/APL Keyboard (#2718):** An 88-key Japanese English/Japanese Katakana typewriter keyboard (see #2717) with modified keytops to allow entry of 81 APL specific characters in addition to the basic character set (Japanese English or Japanese Katakana per keyboard language specify). An APL On/Off key controls whether the keyboard is in APL or basic character set mode. In contrast to #2717, this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: APL/Text #1120 or #3620 and #2955 or #2973. Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**88-Key Japanese English/Japanese Katakana Typewriter Overlay Keyboard (#2719):** This keyboard, without overlay, has the same layout and can be used in the same way as #2708. This keyboard, however, has special narrow keytops to permit use of customer annotated overlays. These overlays are used to show the special font symbols associated with the keys when one of the PS is selected. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES. See "Accessories". See #2708 for additional details. Prerequisites: #2955 or #2973. Limitations: Cannot be installed on a 3278 attached to a 3276. Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**88-Key Attribute Select Japanese English/Japanese Katakana Typewriter/APL Keyboard (#2721):** See #2708 for additional details. Prerequisites: #2955 or #2973. Limitations: Cannot be installed on a 3278 attached to a 3276. Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**Character Set Extension (#3620):** Provides the capability for display of 222-character APL/Text character set, including the 94-character EBCDIC set, and for extended character and highlighting capabilities - blink, reverse video or underscore, and the control and buffering necessary for #5790. Maximum: One. Field Installation: Yes. Corequisites: To permit operator interaction with APL/Text or highlighting, one of the following keyboards may be used. See individual descriptions for details of function(s) provided and for limitation or restrictions. Keyboards with APL capability: #2718, #2721, #4626 or #4652. Keyboard with Text Capability: #4629. Keyboards with Highlighting Capability: #2708, #2719, #2721, #4640, #4651, or #4652. Limitations: (1) This feature is only valid on a 3278 attached to a 3276 with APL/Text Control feature #1067, or to a 3274 mdl X1A, X1C, or X1D customized to include the APL/Text control function. This feature is EBCDIC only and is NOT compatible with ASCII. (2) Cannot be installed with ECSA #3610. (3) Cannot be installed with APL/Text #1120.

**75-Key EBCDIC Typewriter Keyboard (#4621):** Typewriter-like layout, movable, with 49 data keys and 26 control keys. Twelve PF keys are included in the top row of data keys through the use of an alternate shift key. Prerequisites: Keyboard Language, see "Specify". Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**75-Key EBCDIC Data Entry Keyboard (#4622):** Movable, with 35 data keys, 10 PF keys and 30 control keys. Prerequisites: Keyboard language, see "Specify". Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**75-Key EBCDIC Data Entry Keyboard (#4623):** Key punch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. Prerequisites: Keyboard Language, see "Specify". Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**87-Key EBCDIC Typewriter/APL Keyboard (#4626):** An 87-key EBCDIC typewriter keyboard (see #4627) with modified keytops to allow entry of 81 APL specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in basic EBCDIC typewriter or APL mode. In contrast to #4627, this keyboard has only 12 PF keys (PF1 through PF12), which are the group of 12 keys to the right of the main keyboard area. Prerequisites: APL/Text (#1120) or #3620. Keyboard language, see "Specify". Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**87-Key EBCDIC Typewriter Keyboard (#4627):** Typewriter-like layout, movable, with 49 alphanumeric data keys, 26 control keys, and 12 PF keys (24 total PF keys). Twelve of the PF keys are included in the top row of data keys through the use of an alternate shift key. Prerequisites: Keyboard Language, see "Specify". Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**87-Key EBCDIC Typewriter/Text Keyboard (#4629):** An 87-key EBCDIC typewriter keyboard (see #4627) with modified keytops to allow entry of 65 Text specific characters in addition to the 94-character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to #4627, this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: APL/Text (#1120) or #3620 (#2956 only). Limitations: Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes.

**87-Key EBCDIC Typewriter Overlay Keyboard (#4640):** This keyboard, without the overlay, has the same layout and can be used in the same way as #4651 with the basic 94-character EBCDIC character set. This keyboard, however, has special narrow keytops which permit the use of customer annotated overlays. These overlays are used to show the special font symbols associated with the keys when one of the PS is selected. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES. See "Accessories". See Attribute Select Typewriter Keyboard for additional details. Limitations: Cannot be installed on a 3278 attached to a 3276. Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes. Prerequisites: Keyboard language, see "Specify".

**87-Key EBCDIC Attribute Select Typewriter Keyboard (#4651):** Overlay and Attribute Select Keyboards are equipped with PS, highlight and color select function keys. They provide operator selection for data entry, under program control, of PS and highlighting attributes when attached to 3278s equipped with the appropriate features. The desired PS and highlights can be selected by the operator through use of the appropriate PF keys (13-24) in upper case and alternate shift on this Keyboard. Limitations: Cannot be in-

stalled on a 3278 attached to a 3276. Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes. Prerequisites: Keyboard language, see "Specify".

**87-Key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652):** See #4651 for additional details. Limitations: Cannot be installed on a 3278 attached to a 3276. Keyboards used on 3275/3277s are not interchangeable with keyboards used on 3276s/3278s/3279s. Maximum: One keyboard. Field Installation: Yes. Customer Setup: Yes. Prerequisites: Keyboard language, see "Specify".

**Keyboard Numeric Lock (#4690):** Provides keyboard #2715, #2716, #2717, #2718, #4621, #4622, #4623, #4626, #4627, #4629 with the ability to lock the keyboard if a non-numeric key (other than 0-9, minus, decimal sign, or dup) is operated in a pre-defined numeric-only field. Maximum: One. Field Installation: Yes. Contact Customer Engineering Branch Office for installation. MES number 999999 is to be used for IR (Incident Report) completion data. Note: The numeric lock function is enabled on keyboards #2719, #2708, #2721, #4640, #4651, and #4652 as an option of 3274 customization, in which case these keyboards will either all have, or all not have, the numeric lock function.

**Magnetic Reader Control (#4999):** Provides the capability of attaching a Magnetic Hand Scanner (MHS) or Magnetic Slot Reader (MSR) which read encoded information from a magnetic stripe. The MSR can be used when the 3278 is connected to either a 3274 or 3276, but the MHS can only be used when the 3278 is connected to a 3274. (Canada only) Limitations: Cannot be installed with #5315 or #5316. Maximum: One. Field Installation: Yes.

(Canada only) IBM 3278 PC Adapter (#5315, #5316, #5317, #5318, #5321)

**Note:** Features #5315, #5316, #5317, and #5318 are NO LONGER AVAILABLE.

THIS ENTRY IS FOR INFORMATION PURPOSES ONLY. The IBM 3270 PC Attachment (Feature/Item #5315, #5316) contains material for both the 3278 and the IBM Personal Computer System Unit. It is ordered < > (Canada only) as an option on the IBM Personal Computer System Type 5150. If the 3278 mdls 1-4 serial number is in the range A0000-N9999 or 9V000-9W999, order IBM Personal Computer Option Item #5316. For the 3278 mdl 5 and mdl 1-4 with all other serial numbers (e.g., P0123, 1A425, 71G65), order IBM Personal Computer Option Item #5315. Limitations: (1) Cannot be installed on the 3278 with #4999. (2) For 3274 mdls 1A, 1C, 1D, 31A, 31C, 51C, see Control Storage Function Descriptions and Tables for Control Store Requirements or Special Considerations in the M3274 pages. If only the 3278 portion is required and the 3278 is mdl 1-4 with a serial number in the range A0000-N9999 or 9V000-9W9999, or IBM Personal Computer Option Item #5318. If the 3278 is a mdl 5 and any other serial numbers (e.g., P0123, 1A425, 71G65), order IBM Personal Computer Option Item #5317. If only the IBM Personal Computer portion is required, order IBM Personal Computer Option Item #5321. The interconnection cables and User's Guide with the Programming Diskette are included with the IBM Personal Computer Option Item #5321. A User's Guide without the Programming Diskette may be ordered from Mechanicsburg, PA., Form SA230169. Maximum: One. Prerequisites: (A) IBM Personal Computer 5150 mdl X14, X64, or X74 with Color Graphics Monitor Adapter (for 3278 mdls 1-5), or Monochrome Display and Printer Adapter (for 3278 mdls 1-4) or (B) IBM Personal Computer System Unit 5150 with Color Graphics Monitor Adapter (for 3278 mdls 1-5), or the Monochrome Display and Printer Adapter (for 3278 mdls 1-4), Diskette Drive Adapter, one Diskette Drive, and at least 64K total memory; (C) a 3274 or 3276. Only the 3274 can provide file transfer capability. Field Installation: Only. < >

**Programmed Symbols (PS) #5790:** This feature provides the storage and accessing of six 190-symbol sets whose shapes and codes are customer definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is 94 (or 116 for Canadian French or 127 for Japanese Katakana) plus space. Maximum: One. Field Installation: Yes. Limitations: 1) Only available on mdls 2-4. 2) Can only be used with a 3274 having the

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PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. 3) If display operator access to PS is required, #4640, #4651, or #4652, #2719, #2708, or #2721 must be ordered. 4) Cannot be installed with PS-2 or PS-4 (#5781, #5782). Prerequisites: #3620 or ECSA #3610. If already installed. (This feature is no longer available on new machines.)

**Selector Light-Pen (#6360):** A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is provided for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a new designator character "&". When this designator is used the Read Modified operation returns both the addresses and the data of all modified fields on the screen. The #6351 selector light-pen has a slightly wider field of view to facilitate operator ease-of-use. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS

Field installable, except that field conversion of Model 5 with serial numbers(Canada only > A0000 to P0000, <) 8250001 to 8264999 to any other model is not recommended.

## ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the feature number as shown below.

Item	Feature Number	Max Qty
Switch Control Unit	#9181	
Magnetic Hand Scanner	#9440	*
Magnetic Slot Reader	#9441	*
Magnetic Reader Extension Cable --- for use with Magnetic Hand Scanner or Magnetic Slot Reader.		
6m (20 ft)	#9106	**
2m (40 ft)	#9107	**

\* A maximum of one magnetic reader or scanner may be ordered.

\*\* A maximum of one extension cable may be ordered.

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

Item Number	Description
Assm 2577672	Cable Assembly In-Door
Bulk 0323921	Coax Wire (Note 1)
P/N 1836418	Connector Kit (Note 1)
Assm 1833108	Cable Assembly Out-Door
Bulk 5252750	Coax Wire (Note 2)
P/N 1836419	Connector Kit (Note 2)
P/N 1833104	Station Protector Kit,

P/N 2621414	Carbon (Note 4)
P/N 1833106	Modification Kit (Note 3)
	Station Protector
P/N 5252772	Attachment Kit (Note 5)
	Station Protector Element
	Carbon (Note 6)
P/N 5252643	Adapter (Note 7)
P/N 1830818	Station Protection
	Kit, Gas (Note 4)
P/N 5252899	Station Protector
	Element, Gas (Note 6)

Allow a lead time of 120 days.

## Notes:

- Coax wire and one connector kit (includes two connectors P/N #1836446) required for each indoor cable assembly.
- Coax wire and one connector kit (includes two connectors P/N #1836447) required for each outdoor cable assembly.
- Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
- Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
- Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
- Replacement station protector elements.
- Use to join two P/N #2577672 or two P/N #1833108 cable assemblies together.

**Keyboard Overlay:** A keyboard overlay is available on which customer-defined PS can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay P/N 1742762  
88-Keyboard Overlay P/N 1742781

**Keys (P/N 2577741):** The 3278, with Security Keylock, is shipped with two keys. Additional keys may be purchased only from IBM. Vendor will supply additional keys only to original purchaser. A letter of authorization, with key identification, must accompany each order. Allow two to three three weeks for delivery.

**Magnetic Hand Scanner (P/N 4123495):** The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions: For delivery with machine, see chart above.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking --- for 50 scanners, 2 spares --- for 100, 3 --- for 150, 4 --- for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. Authorization Form #2110 applies.

**Magnetic Slot Reader:** The Magnetic Slot Reader (MSR) attaches by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. A magnetic reader attachment feature on the appropriate machine is required to use the MSR.

Ordering Instructions: For delivery with machine, see chart above.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking --- for 50 readers, 2 spares --- for 100, 3 --- for 150, 4 --- for 200, 5.

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a time-and-material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time-and-material basis at the Repair Center. Authorization Form #2110 applies.

A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

Magnetic Slot Reader, P/N 4123500 or feature code #9441  
Dual Entry Magnetic Slot Reader, P/N 4123520 or feature code #9442

**Magnetic Reader Extension Cables:** These cable assemblies can be used to extend the Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. MHS/MSR Extension Cables are warranted free from

defects of workmanship or materials for 90 days. Limitations: Extension cables cannot be plugged into other extension cables.

6m (20 ft), P/N 4832986  
12m (40 ft) P/N 4832987

### Magnetic Reader Replacement Assemblies

Description	P/N
MHS Sensor Head Assembly	4832721
MHS Handle and Feedback Assembly	4832701
MHS Amplifier Card and Cable Assembly	4832727
MSR Arm and Sensor Head Assembly	4832963
MSR Base and Feedback Assembly	4832973
MSR Amplifier Card and Cable Assembly	4832962
MSR Cover	4832964

The following tables list the number of Magnetic Reader replacement assemblies which the customer may want to consider stocking.

### Magnetic Slot Reader

Number of MSRs	Arm & Sensor Head Asmbly P/N	Base and Feedbk Asmbly P/N	Amplfr Card & Cord Asmbly P/N	Cover P/N
4123500	4832963	4832973	4832962	4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**Display Station Keyboard Accessories:** The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3278 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor.

These accessories may be ordered by P/N via (Canada only) a DP Supply Order from the Raleigh plant. <

(Canada only) These accessories should be bulk ordered by P/N on a P&SR from the plant of manufacture. Individual customer requirements should be satisfied from local country stock. <

**Legendable Keytop:** The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

Legendable Keytops:	Part No.
White	5188775
Charcoal Gray	8627192
Light Gray	8542831

**Blank Keytop:** The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

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Blank  
Keytops:                      Part No.

White	1853775
Charcoal Gray	1853567
Light Gray	1853563

**Keytop Extractor (P/N 9900373):** The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

**Switch Control Unit:** Permits switching operational control of a 3278 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

**Warranty:** The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

**Maintenance:** There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

**Ordering Instructions:** This accessory is ordered by P/N via MES for field installation only. For shipment with machine, by feature code number (see "Accessories"). One of the following P/Ns should be ordered when ordering by MES for field installation.

Language	P/N
Brazilian/Portuguese	1743311
Canadian French	1743306
English	1743301
Japanese	1743309
Spanish	1743312

**SUPPLIES (NONE)**

## 3278 DISPLAY CONSOLE MODEL 2A

### PURPOSE

A cathode-ray tube (CRT) display and accompanying keyboard that serves as the primary system console for 4300, 3081/3083/3084 Processors.

**4300 Usage:** The 3278-2A and its appropriate operator control keyboard provides for operator interaction with the processor for both normal operations and maintenance. It is used to effect the major control functions of Power On (4341 and 4381 only), Power Off, Initial Microprogram Load (IML), and Start/Stop. It also serves as the primary console for all operator interaction with the System Control Program. For maintenance and service support, the console displays status of the processor complex and is used for interaction with the processor complex by service and support personnel. It is also used for controlling diagnostic tools.

**3081/3083/3084 Usage:** The 3278-2A and its appropriate operator control keyboard are used to effect the major control functions of Initial Microprogram Load (IML), Start/Stop, manual mode functions, configuration control, and/or activity monitoring of various elements within the processor complex. An additional device over and above the system console is required for operator dialogue with the System Control Program. The 3278 mdl 2A may be located up to 1.500m from the 3081/3083/3084. An operator console keyboard (#4641) must be ordered for use with a 3081/3083/3084.

### MODEL 2A

#### Model 2A A02

**Prerequisites:** An available console position on any 4300 processor or 3082 Processor Controller; see M4331, 4341, 4361, 4381 or 3082 pages.

The 3278 mdl 2A requires an operator console keyboard. The 3278 mdl 2A that is used as the primary console on a 4300 Processor must have an operator console keyboard with an operator control panel.

### HIGHLIGHTS

Displays characters in a 7x14 matrix (uppercase alphabet is displayed in a 7x9 matrix), arranged in 24 rows of 80 characters each. Rows 1 through 20 are usable by the operator and rows 21 through 24 are used for system status information. A 96 character set is used, which consists of 26 upper case alphabetic, 26 lower case alphabetic, 10 numeric and 32 special characters, plus space and null.

The 3278 mdl 2A is used for manually effecting the stopped state functions of alteration and display of storage, address comparing, and full rate processing versus single instructing processing. The console indicates to the operator both proper operation and malfunctions, should they occur.

The 3278-2A is a prerequisite of and normally installed concurrently with the 4300 and 3081/3083/3084 processors.

**Operator Factors:** The 3278 has an anti-glare screen. Indicators are displayed in symbols and/or words outside the data area. The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys.

**Editing:** Cursor move, tab, home, back tab, insert, delete, erase to end-of-field, and erase all input keys are basic to the console keyboard. Alphameric, special symbol and cursor move keys have typamatic capability. 12 Program Function (PF) keys are basic.

**Audible Alarm:** An alarm sounded under program control to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the

next-to-last position on the screen (except when attached to a 4331 Processor). The operator may adjust the volume of the tone.

**System Cables:** For 4300 series processors, refer to the "IBM 4300 Processor Installation Manual - Physical Planning", GA24-3667. For 3081/3083/3084 Processors, refer to the "IBM System/370 Installation Manual - Physical Planning", GC22-7004.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide high availability to the customer. This high availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the Problem Determination Guide manual that will be stored under keyboard palm rest.

**Keyboards:** Refer to "Type Catalog" for a picture of the keyboard layouts. Contact your country Special Product Marketing Representative for RPQ keyboard descriptions.

### SPECIFY

If specify codes are not specified, the machine is shipped with the following specifications:

- (Canada only) > RPQs: Machine has no associated RPQs.
- Voltage: 120V AC, 1-phase, 3-wire, 60 Hz. <
- Power Cable Plug: (Canada only) > Nonlocking. Specify #9890 for a locking plug. < (Japan only) > Locking. Specify #9891 for a nonlocking plug. < See "Special Features" for Waterproof Connector. (Except Japan) > If the most commonly used power cable plug in the country is not desired, then a country RPQ may be initiated. For details concerning power plugs, refer to "IBM Information Display System Installation Manual - Physical Planning" (GA27-2787).
- Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated. <
- Power Cable length: 2.8m (9ft). If the standard 2.8m (9ft) power cable is not desired, specify (Canada only) > #9511 for 1.8m (6ft) cable, or < #9513 for a 4.5m (15ft) cable.
- Except for keyboard languages, the 3-digit Country Code entered on the DPMO will be used to select the following additional Country variables based on the specification most commonly used in that country. Operator control panel and system function key nomenclature are generated by the keyboard language specify.

#### Power Cable Plug Machine Nomenclature

- (Japan only) > Character Set Language: Specify the following if Japanese Katakana is required: #2773 for Japanese Katakana. <
- Power (AC, 1-phase): Specify #2998 and then select one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800*
220V #2813	127V #2823
230V #2821	
240V #2801	

\* Includes requirement for 115V.

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- Keyboard Language: When ordering keyboard (#4631, #4632, #4633 or #4634) also specify one of the following:

Brazil/Portuguese #2975  
Canadian/French #2977  
EBCDIC #2951  
English US #2956  
International #2950  
Japanese English #2955\*  
Katakana #2973\*\*  
Spanish Speaking #2969

\* #2955 applies to #2727, #2728, #2729 or #2720 keyboards.

\*\* #2973 applies to #2720 keyboard only.

- Limitations: All 3278 mdl 2As attached to a 4300 processor must have the same keyboard language.

## SPECIAL FEATURES

**76-Key Jap. Op. Con. KB w/o Chan.-to-Chan. or Power On (#2720):** (4331, 4361) Same as #2727 but the operator control panel does not have the Channel-to-Channel control key, or the Channel-to-Channel Disabled Indicator, or the Power On key. Prerequisites: #2955 or #2973. Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**76-Key Jap. Eng. Op. Con. KB With Chan.-to-Chan. (#2727):** (4341, 4381) Typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate Shift key. Provides 50 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power On/IML, Channel-to-Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, Channel-to-Channel Disabled). Channel-to-Channel is required for systems having a Channel-to-Channel adapter feature. Prerequisites: #2955. Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**76-Key Jap. Eng. Op. Con. KB w/o Chan.-to-Chan. (#2728):** (4341, 4381) Same as #2727 but the operator control panel does not have the Channel-to-Channel control key or the Channel-to-Channel Disabled indicator. Prerequisites: #2955. Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**76-Key Jap. Eng. Op. Console KB (#2729):** Same (4341, 4381) Same as #2727 but with no operator control panel. Prerequisites: #2955. Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**75-Key Op. Console KB With Chan.-to-Chan. (#4631):** (4341, 4381) Typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate shift key. Provides 49 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power On/IML, Channel-to-Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, I/O Interface Disabled). Channel-to-Channel is required for systems having a Channel-to-Channel adapter feature. Prerequisites: Keyboard Language "Specify". Limitations: Keyboards used on 3278 mdl 2A

are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**75-Key Op. Console KB w/o Chan.-to-Chan. (#4632):** (4341, 4381) Same as #4631 but the operator control panel does not have the Channel-to-Channel control key or the Channel-to-Channel Disabled Indicator. Prerequisites: Keyboard Language "Specify". Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**75-Key Operator Console Keyboard (#4633):** (4341, 4381) Same as #4631 but with no operator control panel. Prerequisites: Keyboard Language "Specify". Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**75-Key Op. Con. KB w/o Chan.-to-Chan. or Power On (#4634):** (4331, 4361) Same as #4631 but the operator control panel does not have the Channel-to-Channel control key, or the Channel-to-Channel Disabled Indicator, or the Power On key. Prerequisites: Keyboard Language "Specify". Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**75-Key Operator Console KB (#4641):** (3081, 3083, 3084) Typewriter-like layout, moveable with 12 PF keys available on the top row through the use of the Alternate Shift Key. Provides 49 data keys and 2 control keys, and contains an operator control panel with two (2) control keys (IML, LAMP TEST) and five LED indicators (PC Power in Process, PC Power Complete, PC Power Check, Remote Support Active, IML in Process). Limitations: Keyboards used on 3278 mdl 2A are not interchangeable with keyboards used on 3278 mdls 1-5, nor with keyboards used on 3277 mdls 1-2. Maximum: One keyboard. Field Installation: Yes.

**Security Keylock (#6341):** A lock and key which prevents modification or display of data in the display terminal when in the "off" position. Maximum: One. Field Installation: Yes. Limitations: For Display Console attaching to 4300 processor only.

**(Canada only) Waterproof Power Connector (#8802):** Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type termination in specific locations. Limitations: Available only for power cable lengths of 1.8m (6 ft) (#9511), or 4.5m (15 ft) (#9513). Maximum: One. Field Installation: Not recommended.<)

## MODEL CONVERSIONS

Not recommended for field installation.

## ACCESSORIES

Refer to 3278 mdl 1 "Accessories". Refer to M4300 or 3081 pages for information pertaining to the 4300 Processors Console Table, or the 3081 Processor Console Table.

## SUPPLIES (NONE)

**3278 DISPLAY STATION MODEL 52****PURPOSE**

A cathode-ray tube (CRT) display station used in clusters with the 3274 mdl 52C for displaying Kanji/Chinese and EBCDIC characters and for entering data into and retrieving data from a host computer. A Keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner. With its set of basic and optional features, the 3278 mdl 52 meets both general-purpose and unique display requirements. (Japan only: For 4700 Finance Communication System, see M4701 pages.)

**Note:** Kanji/Chinese is a large character set of ideographic symbols used in the written Japanese/Chinese language and each character is expressed by 2-byte code.

For use with 3274 mdl 52C to display up to 959 Kanji/Chinese characters --- 24 lines of 40 characters each, or up to 1,920 EBCDIC characters --- 24 lines of 80 characters each.

**MODEL 52****Model 52 052**

**Prerequisites:** 3278 mdl 52 requires a 3274 mdl 52C --- see M3274 mdl 52C pages.

**Customer Setup (CSU):** The 3278 mdl 52 is designated Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU refer to the GI section and "IBM 3278 Display Station Model 52 Setup Instruction N," GA18-2060 (for Japan) or T: GA18-2060 (for Taiwan and Hong Kong).

**HIGHLIGHTS**

- Display a Kanji/Chinese character of dot matrix 16X16 (out of 18X16) and a EBCDIC character of dot matrix 7X12 (out of 9X16). The characters of these two matrix sizes can be mixed on a field basis. A 16X16 dot matrix size character is displayed by using two character positions of a EBCDIC dot matrix. Uses 3270 (field) formatting capability which permits individual fields of data on the screen to be program-defined with various attributes such as Kanji/Chinese or EBCDIC in addition to protected/unprotected, normal/highlighted intensity, displayable/ non-displayable, and selector light-pen detection allowed/disallowed. The display character set may be restricted to upper case alphameric characters by the monospace switch (EBCDIC English US only).
- The operator may initiate a local display-to-printer copy function (i.e., without host intervention) from the keyboard of a 3278 mdl 52. When the 3278 mdl 52 is attached to a 3274 mdl 52C, the printer designation is controlled by operator use of the IDENT key and by:
  1. A printer authorization matrix which is loaded into the 3274 mdl 52C through a user written host application program, or
  2. A customer definable matrix loaded from the System Diskette at IML time.
- 3278 mdl 52 provides the capability to display the characters listed below:

**Japan and Hong Kong**

Kanji: 7,190 characters of the IBM Defined Graphic Character Set or up to 7,658 (\*) characters of the User Defined Graphic Character Set.

EBCDIC Japanese Katakana: 127 (\*\*) characters and one space, including Katakana Alphanumeric and Special symbols.

\* IBM offers, with machines, the font image for the IBM Defined Graphic Character Set of 7,190 characters. The User can order the font diskette for the User Defined Graphic Character Set which includes the new characters added by the user. The new characters can be added up to 468 to the 7,190 IBM Defined Graphic Character Set, and also increased up to 3,617 additional characters (total up to 4,085 characters) in place of those in the IBM Defined Graphic character Set. The user designs the font image of a new character added by the user, assigns its code within the code point range allocated by IBM for user's option set, and orders the Font Loading from IBM (NDD).

\*\* 127-character (plus space and null) support is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be 3270 compatible for customers using the NL and EM codes. Customers who do not use the NL and EM codes will be 3274 compatible. For details see "IBM 3270 Kanji Information Display System Component Description N," GA18-2058.

**Taiwan**

Chinese: 7,190 characters of the IBM Defined Graphic Character Set or up to 11,560 (\*) characters of the User Defined Graphic Character Set.

EBCDIC (English US) 94 characters and one space, including Alphanumeric and special symbols.

\* IBM offers, with machines, the font image for the IBM Defined Graphic Character Set of 7,190 characters. The user can order the font diskettes for the User Defined Graphic Character Set which included the new characters added by the user up to 4,370 characters. The user designs the font image of a new character added by the user, assigns its code within the code point range allocated by IBM for user's option set, and orders the Font Loading from IBM (NDD). Font storage Expansion feature on a 3274 mdl 52C is mandatory for Taiwan in order to display up to 11,560 Chinese Character.

**Operator Factors:** The 3278 mdl 52 has an anti-glare screen. Indicators are displayed in symbols on the bottom row of the screen, outside the data area, and provide useful operator information. Host display of data on the screen is accomplished without refresh interrupt (i.e., no blinking).

Kanji/Chinese keyboard allows an operator to depress data keys which are grouped into three regions defined by usage frequency of the characters on the Kanji/Chinese Keyboard. EBCDIC data entry is allowed using a typewriter-like Keyboard embedded in the Kanji/Chinese Keyboard.

The Japanese Katakana or English US keyboard which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys.

**Editing Functions:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for displays equipped with a keyboard. All alphameric, special symbol, and cursor move keys on Japanese Katakana or English US keyboards have typamatic. Double speed cursor typamatic is attained with a simultaneous depressing of the ALT key and a horizontal cursor positioning key on Kanji/Chinese, Japanese Katakana and English US keyboards. The cursor select function provides an alternative to the Selector Light-Pen function. Fields of data may be selected by positioning the cursor and then using the cursor select key.

**Input Flexibility:** A choice of keyboards or the selector light-pen provides input flexibility --- see "Special Feature" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys for Japanese Katakana or English US typewriter keyboards and 24 PF keys for Kanji/Chinese keyboard are provided as basic.

**Keyboards:** Refer to "Type Catalog" for a picture of the keyboard layouts. Contact your country Special Product Marketing Representative for RPQ Keyboard descriptions. Limitations: Keyboards used on 3275/77 machines are not interchangeable with keyboards used on 3278 mdl 52. Keyboards #2715, #2716, and #2717 are supported only for Japan, and keyboards #4621, #4622, #4623, and #4627 are supported only for Taiwan and Hong Kong. Field Installation: Yes. The keyboard is set up by the customer. Specify: For keyboards, #2715, #2716, #2717, #4621, #4622, #4623 and #4627, if standard 0.9 meter (3 foot) keyboard cable is not desired, specify #9399 for 1.8m (6 ft) cable.

**Security Functions:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A security keylock (optional) prevents modification or display of data in the display terminal unless the key is turned to the "on" position. These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to control access to data and audit of actions.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures will be provided in the "IBM 3270 Kanji/Chinese Information Display System Operator's Guide N", GA18-2056 (for Japan) or T, GA18-2056 (for Taiwan and Hong Kong). Also, see "Customer Responsibilities".

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Placement of the 3278 mdl 52.
3. Physical setup, connection of cables in customer access areas, switch settings and check out.
4. Contact Customer Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
5. Notify IBM of intent to relocate and follow IBM instructions for relocation.
6. Use and follow the problem determination procedures.
7. Disconnecting at the time of discontinuance. Appropriate instructions will be provided by IBM.

**Publications:** See specific system bibliography.

## SPECIFY

- Power (AC, 1-phase): Specify #2998 and then select one of the following:  

50 Hz	60 Hz
For Japan and Hong Kong:	
110V #2804	100V #2730
For Taiwan:	110V #2822

For Hong Kong, external voltage converter (100V 200V) is required.
- Plugs: For Japan, specify #9890 for locking plug or #9891 for nonlocking plug. For Taiwan and Hong Kong, specify #9891.

- Power Cord: If standard 2.8m (9 ft) power cable is not desired, specify: #9513 for 4.5m (15 ft) cable.
- Cables: See "Accessories" for cable ordering instructions. For cable specification, see An Introduction to the "IBM 3270 Kanji/Chinese Information Display System, N," GA18-2055 (for Japan) or T, GA18-2055 (for Taiwan and Hong Kong).
- Character Set Language:  

#2782 for Chinese
#2783 for Japanese
- Keyboard Language: For Japan - Specify #2983 when ordering keyboard #2715, #2716, #2717, or #2723.  

For Taiwan and Hong Kong - Specify #2982 when ordering keyboard #2723, #4621, #4622, #4623 or #4627.

Limitations: The Keyboard Language must conform to the character set language. For #2783, specify #2983 (Japan only); for #2782, specify #2982 (Taiwan only).

## SPECIAL FEATURES

**Audible Alarm (#1090):** An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone. Maximum: One. Field Installation: Yes.

**Switch Control Unit (#1720):** This feature permits switching operational control of that display between two different 3274 mdl 52C. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**76-Key Japanese Katakana T/W KB (#2715):** Typewriter-like layout, movable. 12 PF keys are available in the top row of data keys through use of an alternate shift key. This keyboard provides 49 data keys and 27 control keys. Prerequisites: #2983.

**76-Key Japanese Katakana Data Entry KB (#2716):** Movable, four-level shift providing 49 data keys, 10 PF keys and 27 control keys. Prerequisites: #2983.

**254-Key Kanji/Chinese KB (#2723):** Movable, with 216 data keys, 20 function keys, 12 shift keys, two mode keys, one reset key, one enter key, one alternate key and one space bar, for entering 2567 Kanji or 2592 Chinese on-board characters by 12 shift operation, and one blank by Space Bar and not-on-board characters by Gaiji Number and 128 EBCDIC Katakana characters for Japan or 95 EBCDIC English US characters for Taiwan by conventional typewriter like operation. 24 PF keys are provided. Prerequisites: #2983 or #2982.

For Hong Kong, RPQ ZC8810 must be ordered.

**88-Key Japanese Katakana T/W KB (#2727):** Typewriter-like layout, movable, with 49 data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are available in the top row of data keys and are available through the use of alternate shift key. This keyboard provides 4-level shift, 49 data keys and 27 control keys. Prerequisites: #2983.

**75-Key Typewriter KB (#4621):** Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of the data keys through use of an alternate shift key. Prerequisites: #2982.

**75-Key Data Entry KB (#4622):** Movable, with 35 data keys, 10 PF keys and 30 control keys. Prerequisites: #2982.

**75-Key Data Entry KB (#4623):** Keypunch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for data entry. Prerequisites: #2982.

**87-Key EBCDIC Typewriter KB (#4627):** Typewriter-like layout, movable, with 49 alphanumeric data keys, 26 control keys and 12 PF (total 24 PF keys). 12 of the PF keys are included in the top row of

data keys through use of an alternate shift key. Prerequisites: #2982.

**Keyboard Numeric Lock (#4690):** Provides any keyboard (except Kanji/Chinese keyboard) with the ability to lock the keyboard, if a non-numeric key (other than 0-9, minus, decimal sign, or dup) is operated in a pre-defined numeric-only field. Maximum: One. Field Installation: Yes. Prerequisites: Keyboards, #2715, #2716, #2717, #4621, #4622, #4623 or #4627.

**Security Keylock (#6341):** A lock and key which prevents modification or display of protected data in the display terminal when in the "off" position. Maximum: One. Field Installation: Yes.

**Selector Light-Pen (#6351):** A hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is provided for user's incidental items. Selector light-pen (and cursor selector) operations have been expanded to include a new designator character "&". When this designator is used the Read Modified operation returns both the addresses and the data of all modified fields on the screen. Five designator characters in Kanji/Chinese field (Null, Blank, Greater than sign, Question Mark and Ampersand) are coded in two bytes. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

**Coaxial cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787; "Coaxial Cable and Associated Manual," GA27-2805.

- ASSM 2577672 Cable Assembly In-Door
- BULK 0323921 Coax Wire (Note 2)
- P/N 1836418 Connector Kit (Note 2)
- ASSM 1833108 Cable Assembly Out-Door
- BULK 5252750 Coax Wire (Note 3)
- P/N 1836419 Connector Kit (Note 3)
- P/N 1833104 Station Protector Kit, Carbon (Note 5)
- P/N 2621414 Modification Kit (Note 6)
- P/N 1833106 Station Protector Attachment Kit (Note 6)
- P/N 1833104 Station Protector Kit, Carbon (Note 5)
- P/N 5252772 Station Protector Element Carbon (Note 7)
- P/N 5252643 Adapter (Note 8)
- P/N 1830818 Station Protection Kit, Gas (Note 5)
- P/N 5252899 Station Protector Element, Gas (Note 7)

### Notes:

1. Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.
2. Coax wire and one connector kit (includes two connectors P/N #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors P/N #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.

6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two P/N #2577672 or two P/N #1833108 cable assemblies together.

**Keyboard Accessories:** The following keyboard accessories allow the customer to define and change the messages on the keytops of the 3278 keyboards. These accessories affect keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving and a keytop extractor. These accessories are ordered by P/N rather than by MES.

**Legendable Keytop:** The legendable keytop consists of two parts: a molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base, and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear key.) Purchase only.

Legendable Keytops:	P/N
White	5188775
Charcoal Gray	8627192
Light Gray	8542831

**Blank Keytop:** The blank keytop is for use as an unlabeled keytop or for customer engraved nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear key.) Purchase only.

Blank Keytops:	P/N
White	1853775
Charcoal Gray	1853567
Light Gray	1853563

**Keytop Extractor (P/N 9900373):** The keytop extractor is a small small tweezer-like device which fits between keytops. With a firm squeezing grip on a keytop, it can be pulled off its stem. The customer should use the extractor whenever a keytop is to be removed from a keyboard. Purchase only.

**Keyboard Overlay:** A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

Keyboard Overlay	P/N 1742762
88-Keyboard Overlay	P/N 1742781

**Keys (P/N 2577741):** The 3278 with Security Keylock #6340 is shipped with two keys. Additional keys may be purchased only from IBM. Vendor will supply additional keys only to original purchaser. A letter of authorization, with key identification number (stamped on key) must accompany each order. Allow two to three weeks for delivery.

**Magnetic Hand Scanner (P/N 4123495):** The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

**Ordering Instructions:** For delivery with machine, see "Machines" pages. When ordering via MES, order from Raleigh.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There

is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking --- for 50 scanners, 2 spares --- for 100, 3 --- for 150, 4 --- for 200, 5.

**Warranty:** The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service for the Magnetic Scanners will be preformed by the CE. The customer can obtain post-warranty maintenance on a Time and Material basis from CE. The customer can obtain post warranty maintenance on a time and material basis at the IBM Repair Center, Paramus, NJ.

**Magnetic Slot Reader (P/N 4123500, Feature #9441):** The Magnetic Slot Reader (MSR) attaches by a 1.5 meter cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. A magnetic reader attachment feature on the appropriate machine is required to use the MSR.

**Ordering Instructions:** For delivery with machine, see "Machines" pages. When ordering via MES, order from Raleigh.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking --- for 50 readers, 2 spares --- for 100, 3 --- for 150, 4 --- for 200, 5.

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. Warranty service for the Magnetic Scanners will be preformed by the CE. Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from C E. A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

**Magnetic Reader/Scanner Extension Cables:** These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List. MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. Limitations: Extension cables cannot be plugged into other extension cables.

6m (20 ft), P/N 4832986  
12m(40 ft), P/N 4832987

#### Magnetic Reader/Scanner Replacement Assemblies

Description	P/N
MHS Sensor Head Assembly	4832721
MHS Handle and Feedback Assembly	4832701
MHS Amplifier Card and Cable Assembly	4832727
MSR Arm and Sensor Head Assembly	4832963

MSR Base and Feedback Assembly	4832973
MSR Amplifier Card and Cable Assembly	4832962
MSR Cover	4832964

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

#### Magnetic Hand Scanner

Number of MHSs	Sensor Assemblies	Handle and Feedback Assembly	Amplifier Card and Cord Assembly
P/N	P/N	P/N	P/N
4123495	4832721	4832701	4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

#### Magnetic Slot Reader

Number of MSRs	Arm and Sensor Head Assem	Base and Feedback Assem	Amplifier Card and Cord Assem	Cover
P/N	P/N	P/N	P/N	P/N
4123500	4832963	4832973	4832962	4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Warranty:** Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**Switch Control Unit:** Permits switching operational control of a 3278 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

**Warranty:** The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

**Maintenance:** There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

**Ordering Instructions:** This accessory is ordered by P/N via MES for field installation only. For shipment with machine, by Feature Code number (see M3278).

One of the following P/Ns should be ordered when ordering by MES for field installation.

3278

Language	P/N
Brazilian/Portuguese	1743311
Canadian French	1743306
English	1743301
Japanese	1743309
Spanish	1743312

#### SUPPLIES (NONE)

## 3279 COLOR DISPLAY STATION MODELS 2A-3B

(NO LONGER AVAILABLE)

The 3279 models 2A, 2B, 3A and 3B are no longer available. MES orders for model changes, features, released RPQs, and accessories are not affected. No new RPQs will be accepted. See other M3279 model pages.

### THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

#### PURPOSE

A high quality color cathode ray tube (CRT) display station used in clusters with the 3274, the 3276, or the 4331 Processor for displaying alphanumeric data, and for entering data into and receiving data from a S/360, S/370, 4300, 4700 Finance Communication System, or 8100 Information System. In base color mode on all models data fields may be displayed in a choice from four colors. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner.

On extended color models 2B and 3B of the 3279, attached to a 3274, data may be displayed at both character and field level in seven colors, with a choice of highlighting modes. APL/Text is provided. Customer specified symbols and shapes may be displayed in any character position using Programmed Symbols. With its set of basic and optional features the 3279 meets both general purpose and unique display requirements.

#### MODELS 2A, 3A, 2B, 3B

##### Base Color

**Model 2A A02:** Displays up to 1,920 characters in 24 lines of 80 characters each.

**Model 3A A03:** Displays up to 2,560 characters in 32 lines of 80 characters each.

##### Extended Color

**Model 2B B02:** Displays up to 1,920 characters in 24 lines of 80 characters each.

**Model 3B B03:** Displays up to 2,560 characters in 32 lines of 80 characters each.

For use with 8100 Information System, see the "8100 System Configurator", GA27-2876. For use with 4700 System, refer to M4701 pages.

**Prerequisites:** 3279 requires a keyboard and a 3274 or 3276 with appropriate features, or a 4331 - see M3274, 3276, or 4331 pages.

##### Note:

**Customer Setup (CSU):** The 3279 is designated Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

#### HIGHLIGHTS

Characters are displayed within a 9x12 character matrix on all mdls. On all mdls the basic 26 character uppercase letters are presented in 7x9 character matrix. A 94-character set is displayed consisting of 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters. A monospace switch provides the capability of switching to uppercase alphanumeric mode. The 3279 uses 3270 field formatting capability that permits individual fields of data on the screen to be program defined with various attributes, such

as protected/unprotected, normal/intensified, displayable/non-displayable and selector light-pen detection allowed/disallowed. An audible alarm is provided.

All 3279 mdls use the 3270 formatting attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following table.

Protected and intensified -- White  
Unprotected and intensified -- Red  
Protected and normal intensity -- Blue  
Unprotected and normal intensity -- Green

Extensions to 3270 data stream supported by appropriate 3274 features and by 3279 mdls 2B and 3B and the optional Programmed Symbols (PS) features provide the following field and character attributes:

- Extended Color (red, blue, green, white, yellow, turquoise and pink)
- Extended Highlighting (reverse video, blink, underscore)
- Programmed Symbols (six sets with 190 loadable positions each)

Each attribute can be specified independently of any other. Special keyboards are provided to allow operator control of these attributes.

Programmed Symbols can use the whole character matrix for symbol definition.

In addition, three of the sets of Programmed Symbols allow symbols and shapes to be displayed using multiple colors within a single character location.

(Canada only) > 3270 Personal Computer Attachment enables the IBM Personal Computer, 5150, to be attached to the 3279 mdls 2A, 3A, 2B, 3B. The display station and associated keyboard become common to both the host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station. < )

3279 mdls 2B and 3B provide Extended Color, Extended Highlighting and APL/Text. 3279 mdls 2B and 3B are supported on 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C, and on the 3276 for APL/Text operation.

APL/Text capability provides for display of a 222-character APL/Text character set including the 94/116/127 character EBCDIC set. An appropriate keyboard is available. APL/Text requires a 3274 mdl X1A, X1C, or X1D, customized to include the APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function Base feature. APL/Text operates in EBCDIC mode only and is NOT compatible with ASCII.

For Extended Color and Extended Highlighting on the 3279 mdls 2B and 3B, the structured field and Attribute Processing option of Configuration Support C or D is required on the 3274. The 3279 PS features require the Programmed Symbols option of the 3274 Configuration Support C or D. Extended Color, Extended Highlighting and PS function operate in EBCDIC mode only and are not compatible with ASCII. The 3279 mdl 2A will attach to the Display/Printer Adapter of the 4331 Processor.

For base color mode of operation, all mdls of the 3279 will attach to all mdls of the 3274. Configuration support on the 3274 must be at the following level or higher:

Configuration A - Release 11.1  
Configuration B - Release 22.0  
Configuration C  
Configuration D  
Configuration T

On the 3276, for base color mode, 3279 mdls 2A and 2B will attach to all 3276 mdls except mdl 1 and 3279 mdls 3A and 3B will attach to all 3276 mdls except mdls 1 and 2.

The operator may initiate a local display-to-printer (monochrome or color 3287) copy function (i.e., without host intervention) from the keyboard of a 3279 (except for graphics use of PS). When the 3279 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:

1. A printer authorization matrix which is loaded into the 3274 through a user-written host application program, or
2. A customer-definable matrix loaded from the System Diskette at IML time. For further details, see the "IBM 3270 Information Display System Planning and Setup Guide", GA27-2827.

When the 3279 is attached to 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

**Operator Factors:** The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols on the bottom row of the screen, outside the data area and provide useful operator information. These symbols, except those indicating color attributes will appear in blue. Display of data on the screen is accomplished without refresh interrupt (except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes. The cursor is displayed in white on the 3279.

A base color switch allows the 3279 mdls 2A and 3A to run in 'monochrome mode' for 3278 compatibility. In this mode fields are displayed in green for normal intensity and in white for high intensity. The switch has the same function on the 3279 mdls 2B and 3B if no extended color attributes are specified in the data stream. When extended color attributes are specified, the switch setting is ignored. Extended color will be displayed for those fields and characters for which it is specified. Other fields and characters will be displayed in green with white for high intensity.

For comfortable viewing the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees, or 20 degrees from the vertical.

The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

**Editing Functions:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for 3279 displays. All alphabetic, special symbol, and cursor move keys have repeat action capability. Double-speed cursor repeat action is attained with simultaneous depressing of the ALT key and a horizontal cursor positioning key.

**Input Flexibility:** A choice of keyboards and/or the selector light-pen provide input flexibility. A Magnetic Slot Reader (optional) and for a 3279 attached to a 3274, a Magnetic Hand Scanner (optional) are available for the input of magnetically coded data -- see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys are basic with all typewriter keyboards. When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, word wrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended for use primarily with a specific set of host editor programs. See M3274 pages for languages supported. See "Accessories" for 3274 Entry Assist keytops kits.

**Keyboards:** Refer to Type Catalog for a picture of the keyboard layouts. Contact your country Special Product Marketing Representative for RPQ keyboard descriptions. Limitations: Each 3279 Color Display Station must be equipped with a keyboard. Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. Maximum: One.

Field Installation: Yes. The keyboard is set up by the customer. A 0.9m (3 ft) keyboard cable is provided as standard.

**Overlay and Attribute Select Keyboards:** These keyboards are equipped with highlight, PS and color select function keys (12 PF keys on right-hand side of the keyboard). They provide operator selection under program control, of highlight, PS and color attributes.

Except for the color marking and annotation on the 12 PF keys on the right-hand side of the keyboard, the Overlay and Attribute Select keyboards appear identical to the equivalent non-Overlay and non-Attribute Select keyboards. Use of keys to select a feature not on the display will cause an error indication in the operator guidance row on the display. The uppercase and alternate shift of these 12 PF keys are used for attribute selection and are, therefore, not available for normal program function use. Limitations: Attribute selection is NOT supported for keyboards on a 3279 mdl 2B or 3B attached to a 3276, OR for keyboards attached to a 3279 mdl 2A or 3A.

**Security Functions:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock (optional) prevents modification or display of data in the display terminal unless the key is turned to the 'on' position. These capabilities and the terminal's ability to identify itself to the host program allow customer-supplied security program routines to help control access to data and aid audit of actions. A Magnetic Slot Reader (optional), and for 3279 attached to a 3274, a Magnetic Hand Scanner (optional) are available to enter system user identification.

When attached to a 4331 Processor via the Display/Printer Adapter, functional support varies from that of the 3279-2A attached to a 3274 or 3276. See M4331 Display/Printer Adapter feature description for details of support.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the "Problem Determination Guide" manual that can be stored under the keyboard palm rest. Also, see "Customer Responsibilities".

Display Exception Monitoring Facility (DEMF), a software tool for network problem determination/isolation enhances the availability and serviceability of the 3274 and the 3276 in BSC mode. See "DEMF" in the SCP section for OS/VS1 and OS/VS2 (MVS).

#### **Customer Responsibilities:**

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 3279.
3. Physical setup, connection of cables in customer access areas, switch setting and check out.
4. Contacting CE to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
5. Notifying IBM of intent to relocate and following IBM instructions for relocation.
6. Using and following the problem determination procedures and filling out trouble report prior to calling for IBM service.
7. Disconnection, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

**Note:** 3279 attachment to 3274 may require increments of 3274 control storage. Refer to 3274 control storage requirement tables to ensure that adequate Extended Function Store is available if required.

**Bibliography:** See "KWIC Index", G320-1621, or specific system bibliography.

### SPECIFY

Specify codes may not be necessary to order a 3279. If codes are not specified, the machine is shipped with the following specifications:

- Power Cable Length: 2.8m (9 ft)
- Power Cable: If standard 2.8m (9 ft) power cable is not desired, specify #9513 for 4.5m (15 ft).
- Keyboard Cable Length: 0.9m (3 ft).
- Cables - See "Accessories" for cable ordering instructions.
- Power (AC, 1-phase, 50/60 Hz): Specify #2998 and one of the following: #2804 for input voltages between 100V and 120V. If 127V is required, specify #2820. Specify #2806 for input voltages between 200V and 230V. If 240V is required, specify #2801.

For Canada only, specify #9890 for locking plug or #9891 for non-locking plug (both at 60Hz, 120V, 1-phase). Canada will use the same power cord and plugs as the US.

For Japan only, specify #9890 for locking plug or #9891 for non-locking plug for voltages under 200 volts.

Plugs: The 3-digit country code (except Canada and Japan) on the DPMO sheet will be used to select a power plug which matches the most commonly used power supply in each country. If an exception is required, a country RPQ may be initiated.

- Power Cable Plug: If the most commonly used power cable plug in the country is not desired, then a country RPQ may be initiated. For details concerning power plugs, refer to "IBM 3270 Information Display System Installation Manual - Physical Planning", GA27-2787.

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

- Machine Nomenclature. Specify as follows:

Brazilian #2938  
 Canadian Bilingual #2935  
 English US #2931  
 Japanese #2930  
 Spanish Speaking #2931

- Keyboard Language and Character Set. Specify as follows:

Brazilian #2975  
 Canadian/French #2977  
 EBCDIC #2951  
 English UK #2958  
 English US #2956  
 International #2950  
 Japanese English #2955 (1)  
 Japanese Katakana #2973 (2)  
 Spanish Speaking #2969

**Note 1:** Japanese English applies only to keyboards #4622, #4623, #2708, #2715, #2717, #2718, #2719, #2721.

**Note 2:** Japanese Katakana applies only to keyboards #2708, #2715, #2716, #2717, #2718, #2719, #2721.

**Note:** English US (#2956) must be specified when keyboard #4629 (87-key typewriter/text) is used.

- Katakana Support: 127 characters (plus space and null) support is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be 3270

compatible for customers using the NL and EM codes. Customers who do not use these codes will be 3274 and 3276 compatible. For details, see appropriate SRLs.

- Keyboard Language: All 3279s in a 3274/3276 cluster must specify the same keyboard language as that used on the 3274/3276. The keyboard language for 3279s on a 4331 must correspond with one of the language options specified on the 4331.

### SPECIAL FEATURES

Not all of the following special features are supported for 3279-2As attached to a 4331 processor via the Display/Printer Adapter. See M4331 Display/Printer Adapter feature description for details of support.

**Switch Control Unit (#1720):** This feature, when installed on a 3279, permits switching operational control of that display between two different control units. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**88-Key Attribute Sel. Jap. Eng./Jap. Kat. T/W KB (#2708):** Typewriter layout, movable, similar to #2717. Attribute Select functions are shown on the 12 function keys at the right hand side of these keyboards. Prerequisites: 3279 mdl 2B or 3B and #2955 or #2973. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**76-Key Jap. Eng./Jap. Kat. T/W KB (#2715):** Typewriter-like layout, movable. 12 PF keys are available in the top row of data keys through use of an alternate shift key. The 76-key Japanese English Typewriter Keyboard provides 49 data keys and 27 control keys. Prerequisites: #2955 or #2973.

**76-Key Jap. Kat. Data Entry KB (#2716):** Movable, 4-level shift providing 49 data keys, 10 PF keys and 27 control keys. Prerequisites: #2973.

**88-Key Jap. Eng./Jap. Kat. T/W KB (#2717):** Typewriter-like layout, movable, with 49 data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are available in the top row of data keys and are available through the use of the alternate shift key. The Japanese Katakana keyboard provides 4-level shift, 49 data keys and 27 control keys. Prerequisites: #2955 or #2973.

**88-Key Jap. Eng./Jap. Kat. T/W/APL KB (#2718):** An 88-key Japanese English/Japanese Katakana Typewriter Keyboard (see #2717) with modified keytops to allow entry of 81 APL-specific characters in addition to the basic character set Japanese English or Japanese Katakana. An APL On/Off key controls whether the keyboard is in APL or basic character set mode. In contrast to the 88-key Japanese English/Japanese Katakana Typewriter Keyboard without APL (see #2717), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: 3279 mdl 2B or 3B and #2955 or #2973.

**88-Key Jap. Eng./Jap. Kat. T/W Overlay KB (#2719):** This keyboard, without overlay has the same layout and can be used in the same way as the 88-key Japanese English/Japanese Katakana Typewriter Keyboard (see #2717). This keyboard however has special narrow keytops to permit the use of customer-annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES. See "Accessories". These overlays are used to show the symbols associated with the keys when one of the sets of Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys in uppercase and alternate shift on this keyboard. Overlay keyboards are equipped with highlight, PS and color select function keys. (12 PF keys on the right-hand side of the keyboard.) Enhanced functions are NOT supported on 3279 mdls 2A and 3A. Prerequisites: #2955 or #2973. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**88-Key Attribute Sel. Jap. Eng./Jap. Kat. T/W/APL KB (#2721):** Typewriter layout, movable, similar to the 88-key Japanese English and Japanese Katakana Typewriter/APL keyboard (#2718). Attri-

bute Select functions are shown on the 12 PF keys at the right hand side of these keyboards. Prerequisites: 3279 mdl 2B or 3B and #2955 or #2973. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**75-Key EBCDIC Typewriter KB (#4621):** Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through use of an alternate shift key. Specify: Language required.

**75-Key EBCDIC Data Entry KB (#4622):** Movable, with 35 data keys, 10 PF keys and 30 control keys. Specify: Language required.

**75-Key EBCDIC Data Entry KB (#4623):** Keypunch layout, movable, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for data entry. Specify: Language required.

**87-Key EBCDIC Typewriter/APL KB (#4626):** An 87-key EBCDIC Typewriter Keyboard (#4627) with modified keytops to allow entry of 81 APL-specific characters in addition to the 94-character EBCDIC set. An APL On/Off key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC Typewriter Keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: 3279 mdl 2B or 3B. Specify: Language required.

**87-Key EBCDIC Typewriter KB (#4627):** Typewriter-like layout, movable, with 49 alphameric data keys, 26 control keys, and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of the alternate shift key. Specify: Language required.

**87-Key EBCDIC Typewriter/Text KB (#4629):** An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 Text-specific characters in addition to the 94-character EBCDIC set. A Text On/Off key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to an 87-key EBCDIC Typewriter Keyboard without Text (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: 3279 mdl 2B or 3B. #2956 only.

**87-Key EBCDIC Typewriter Overlay KB (#4640):** This keyboard, without overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (see #4627) with the 94-character EBCDIC set. This keyboard however, has special narrow keytops that permit the use of customer-annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES. See "Accessories". These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys (12 PF keys on the right hand side of the keyboard) in uppercase and alternate shift of this keyboard. Enhanced functions are NOT supported on 3279 mdls 2A and 3A. Specify: Language required. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**87-Key EBCDIC Attribute Select Typewriter KB (#4651):** A typewriter layout, movable, similar to the 87-key EBCDIC Typewriter Keyboard #4627. Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. Prerequisite: 3279 mdl 2B or 3B. Limitations: Cannot be installed on a 3279 attached to a 3276. Specify: Language required.

**87-Key EBCDIC Attribute Select Typewriter/APL KB (#4652):** A typewriter layout, movable keyboard, similar to the 87-key EBCDIC Typewriter Keyboard #4626. Attribute select functions are shown on the 12 PF keys at the right hand side of the keyboard. Prerequisite: 3279 mdl 2B or 3B. Limitation: Cannot be installed on a 3279 attached to a 3276. Specify: Language required.

**Keyboard Numeric Lock (#4690):** Provides keyboards #2715, #2716, #2717, #2718, #4621, #4622, #4623, #4626, #4627, #4629, with the ability to lock the keyboard, if a non-numeric key (other than 0-9, minus, decimal sign, or dup) is operated in a pre-defined numeric-only field. Maximum: One. Field Installation: Yes. Con-

tact local CE Branch Office for installation. MES No. 999999 is to be used for Incident Report (IR) completion data.

**Note:** The Numeric Lock Function is enabled on Keyboards #2719, #2708, #2721, #4640, #4651, #4652 as an option of 3274 customization in which case these keyboards will either all have, or all not have, the numeric lock function.

**Magnetic Reader Control (#4999):** Provides the capability of attaching a Magnetic Slot Reader or a Magnetic Hand Scanner which read encoded information from a magnetic stripe. The MSR can be used when the 3279 is connected to either a 3274 or 3276, but the MHS can only be used when the 3279 is connected to a 3274. Maximum: One. Field Installation: Yes.

**(Canada only> IBM Personal Computer Adapter (#5322, #5325, #5327):** This entry is for information purposes only - see Product Announcement Letter <) (Canada only> for ordering instructions and prices. Provides the capability of attaching an IBM Personal Computer, 5150, System Unit to the 3279. If only the IBM Personal Computer 5150 portion is required, order #5322. If only the 3279 portion is required, order #5327. The interconnection cables and user's guide with the Programming Diskette are included with the Personal Computer option #5322. A user's guide without the Programming Diskette may be ordered from Mechanicsburg, PA, using Form Number SA23-0169. Maximum: One. Prerequisites: (1) 3279 mdls 2A or 3A or 2B or 3B. (2a) IBM Personal Computer, 5150, mdl X14, X64, or X74 with Color/Graphics Monitor Adapter, or (2b) IBM Personal Computer System Unit with Color/Graphics Monitor Adapter, 5-1/4 inch Diskette Drive Adapter and one 5-1/4 inch Diskette Drive, and at least 64KB total user memory. (3) IBM Personal Computer DOS 1.1 or DOS 2.0. (4) a 3274 or 3276 control unit. Limitations: Cannot be installed with #4999, #6350 or #6351. Field Installation: Yes. Contact <) (Canada only> CE <) (Canada only> Branch Office for installation. <)

**Programmed Symbols (PS) (#5781 and #5782):** These features provide storage and accessing for up to six 190-symbol sets whose shapes and codes are customer-definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard.

The number of symbols in any one set that can accessed from the display keyboard is 94 or 116 for Canadian French or 127 for Japanese Katakana plus space.

**PS-2, (#5781)** Provides PS control and storage for two 190-symbol sets. Prerequisites: 3279 mdl 3B.

**PS-4, (#5782)** Provides control and storage for four additional 190-symbol sets. Three of these symbol sets can be displayed using multiple colors within a character block. Prerequisites: #5781. Limitations: Can be used only with a 3274 having the PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. Maximum: One of each. Field Installation: Yes. Corequisites: If display operator access to PS is required, #2708, #2719, #2721 #4640, #4651 or #4652 must be ordered.

**Note:** If the 3279 is to be used with the Presentation Graphics Feature (PGF) of the Graphical Data Display Manager (GDDM) Program Product 5748-XXH, then both #5781 and #5782 must be installed.

**Security Key Lock (#6340):** A lock and key which prevents modification or display of data in the display terminal when in the 'off' position. Maximum: One. Field Installation: Not recommended.

**Selector Light-Pen (#6350, #6351):** (#6350 mdls 3A, 3B, #6351 mdls 2A, 2B) Hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen will detect on any color. The selector light-pen, while not being used, can be placed in a recess of the keyboard, which is provided for user's incidental items. Selector light-pen (and cursor select) operations have been expanded to include a designator character "&". When this designator is used, the Read Modified operation returns both the addresses and the data of all modified fields on the screen. The selector light-pen (#6351) has a slightly wider field of view to facilitate operator use. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS

Model changes from 2A to 2B and 3A to 3B are field installable. Model changes from 2A to 3A or 3B or from 2B to 3A or 3B are not recommended for field installation.

## ACCESSORIES

For shipment with machine, order the feature number as shown below. See detailed descriptions below for additional information and for ordering by MES for field installation.

Item	Feature Number	P/N	Max Qty
Magnetic Hand Scanner	#9440	4123495	*
Magnetic Slot Reader	#9441	4123500	*

\* A maximum of one magnetic reader or scanner may be ordered.

Magnetic Reader Extension Cable for use with Magnetic Hand Scanner or Magnetic Slot Reader:

Item	Feature Number	P/N	Max Qty
6 meter (20 feet)	#9106	4832986	**
12 meter (40 feet)	#9107	4832987	**

\*\* A maximum of one extension cable may be ordered.

Item	Feature Number	P/N
Tilt/rotate accessory	N/A	4422265
Control Unit Switch	MES only	
Battery	N/A	

The following cable assemblies can be used to extend the Magnetic Hand Scanner and Magnetic Slot Reader distances. Limitations: Extension cables cannot be plugged into other extension cables. Prerequisites: #4999.

Item	Feature Number	P/N
6 meter (20 feet)	#9106	4832986
12 meter (40 feet)	#9107	4832987

If ordering by MES for field installation, one of the following manuals should be ordered. English manual is always supplied. The MSR/MHS customer service manuals, and their form numbers, are:

French GA11-0007  
Spanish GA10-8101  
Japanese NGA24-3663

Both the MHS and the MSR read magnetically encoded information from an alphanumeric character set. The MSR also reads the same 10-character numeric only set as the 3277 Operator Identification Card Reader (#4600) which is not a subset of the alphanumeric character set. For a further description of both character sets, see "IBM 3270 Information Display System Character Set Reference", GA27-2837. Either (not both) the alphanumeric or the 10 numeric only 3277-like character set may be selected for the 3274 at customization time for attached 3278s and 3279s. The 3276 Control Unit Display Station and attached 3278s and 3279s support only the MSR and the 10-character numeric only set as used by the 3277.

Numeric and alphameric character capabilities are as follows:

	Minimum number of Hex Codes	Maximum number of characters	Density Bits
MSR/			

MHS	between start and end sentinel chars	per inch	per mm
3277-Like			
10-num char set*	7	37	75
	7	118	127
Alpha-meric char set*	7	37 num	75
	7	18 non-num	75
	7	118 num	127
	7	59 non-num	127
	7	37 num	210**

\* 1 Hex code = 1 numeric character  
2 Hex codes = 1 non-numeric character  
\*\* MSR only

**Note:** Full width encoding is recommended for the MSR and is required for the MHS.

Maximums shown are ALL numeric or ALL non-numeric characters. If a combination of numeric and non-numeric characters is recorded, the total number of hex CODES must not exceed the numeric character maximum. For example, at 127 bpi, a combination of 60 numeric and 20 non-numeric character is permissible.

**Limitations:** 3277-like 10 character set numerics only magnetic cards coded with Alternate End or Message character (hexadecimal 'C'), cannot be read by the MSR or MHS. The alphanumeric character set and the MHS are only supported on 3278s and 3279s which are attached to 3274s. IBM Host Programming Support is provided for alphameric character set non-protected, display data entry. Protected, non-display data entry is supported by IMS and TSO. With this protected, non-display data entry support, all cards and documents which can be read by the 3630 Plant Data Communication System, up to 118 data characters, can be read by the 3270 System.

A variety of magnetic documents, tags and labels which the MSR and MHS can read, may be obtained from IBM, some of which, depending on length, can be encoded by devices such as the 3642 Encoder Printer.

**Switch Control Unit:** Permits switching operational control of a 3279 between two different control units. Customer is responsible for Procurement and installation of this accessory, and also for the replacement of a defective unit.

**Warranty:** The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days.

**Maintenance:** There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

**Ordering Instructions:** This accessory is ordered by P/N via MES for field installation only.

One of the following P/Ns should be ordered when ordering by MES for field installation.

English 4419338  
Canadian French 4419343  
Japanese 4419346  
Brazilian/Portuguese 4419348  
Spanish 4419349

**Lithium Battery (P/N 6042018):** This supply item is a 3.0 Volt non-rechargeable lithium battery which provides power to sustain the convergence parameters in the 3279 when normal power is not present. Field Installation: Yes, by customer. Note: Discharged batteries should be returned to IBM for disposal, return information is printed on the label. Ordering Information: Order by DP Supply Order from Mechanicsburg.

**Keyboard Overlay (P/N 1742762):** A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

88-Keyboard Overlay P/N 1742781

**Keys (P/N 4420756):** The 3279 with Security Keylock #6340 is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys only to original purchaser). A letter of authorization, with key identification (on customer metal tag), must accompany each order. Allow two to three weeks for delivery.

**Magnetic Hand Scanner (#9440, P/N 4123495):** The Magnetic Hand Scanner (MHS) attaches by a 1.5m (5 ft) coiled cable to a 3279 that has an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. It can read a stripe in either direction. Field Installation: Yes. Prerequisites: #4999. See Note 1.

Ordering Instructions: For delivery with machine, see "Machines" pages. When ordering via MES, order from Raleigh.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking: For 50 scanners, 2 spares; for 100, 3; for 150, 4; for 200, 5.

**Warranty:** The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time-and-Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time-and-materials basis at the Repair Center. Authorization Form #2110 applies.

**Magnetic Slot Reader (#9441, P/N 4123500):** The Magnetic Slot Reader (MSR) attaches by a 1.5m (5 ft) cable to a 3279 that has an appropriate magnetic adapter feature. The slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including job tickets, magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. Field Installation: Yes. Prerequisites: #4999. See Note 1.

Ordering Instructions: For delivery with machine, see above. When ordering via MES, order from Raleigh.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases,

more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking: For 50 readers, 2 spares; for 100, 3; for 150, 4; for 200, 5.

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a time-and-material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. Authorization Form #2110 applies. A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

**Magnetic Reader/Scanner Extension Cables:** These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

Limitations: Extension cables cannot be plugged into other extension cables.

6m (20 ft) P/N 4832986  
12m (40 ft) P/N 4832987

#### Magnetic Reader/Scanner Replacement Assemblies:

MHS Sensor Head Assembly 4832721  
MHS Handle and Feedback Assembly 4832701  
MHS Amplifier Card and Cable Assembly 4832727  
MSR Arm and Sensor Head Assembly 4832963  
MSR Base and Feedback Assembly 4832973  
MSR Amplifier Card and Cable Assembly 4832962  
MSR Cover 4832964

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

#### Magnetic Hand Scanner Replacement Assembly Stocking:

No. of MHSS P/N	Sensor Head Assy P/N	Handle & Feedback Assy P/N	Amplifier Card and Cord Assy P/N
4123495	4832721	4832701	4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

#### Magnetic Slot Reader Replacement Assembly Stocking:

Number of MSRs P/N	Arm & Sensor Head Assembly P/N	Base and Feedback Assembly P/N
4123500	4832963	4832973

50	2	1
100	3	1
150	4	1
200	5	2
Number of MSRs	Amplifier Card and Cord Assy	Cover P/N
P/N 4123500	P/N 4832962	4832964
50	2	1
100	3	1
150	4	1
200	5	1

Ordering Instructions: Order from CE Stockrooms. See Instruction Letter ZM77-0038, DPCE letter #27 dated October 19, 1977.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**Display Station Keyboard Accessories:** The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3279 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving, a keytop extractor, and an Entry Assist Keytop Kit.

These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.

(Canada only) These accessories should be bulk ordered by P/N on a P&SR from the plant of manufacture. Individual customer requirements should be satisfied from local country stock. <)

**Legendable Keytop:** The legendable keytop consists of two parts: A molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

White 5188775  
Charcoal Gray 8627192  
Light Gray 8542831

**Blank Keytop:** The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

White 1853775  
Charcoal Gray 1853567  
Light Gray 1853563

**Keytop Extractor (P/N 9900373):** The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled off its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

**Entry Assist Keytop Kit:** (Non-overlay keyboards only) This kit provides eight sets of five keytops appropriately labelled for use with the Entry Assist capability together with a keytop extractor and keytop replacement instruction. Not for use on 3178 keyboards or overlay keyboards. The Keyboard Languages and P/Ns are:

Brazil 4942307  
Canadian Bilingual 4942308  
International, EBCDIC/WT 4942311  
Japanese English 4942315  
Spanish Speaking 4942318  
English UK 4942312  
English US 1742774

**Display Station Tilt/Rotate Accessory (P/N 4422265):** An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

For the countries in which it is released, the Tilt Rotate Accessory is an NDD Product.

Warranty: The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

Maintenance: There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

Customer Responsibility: The customer is responsible for mounting the Display Station on this accessory.

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

**Coaxial cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

- Assm 2577672 Cable Assembly In-Door
- Bulk 0323921 Coax Wire (Note 1)
- P/N 1836418 Connector Kit (Note 1)
- Assm 1833108 Cable Assembly Out-Door
- Bulk 5252750 Coax Wire (Note 2)
- P/N 1836419 Connector Kit (Note 2)
- P/N 1833104 Station Protector Kit, Carbon (Note 4)
- P/N 2621414 Modification Kit (Note 3)
- P/N 1833106 Station Protector Attachment Kit (Note 5)
- P/N 5252772 Station Protector Element Carbon (Note 6)
- P/N 5252643 Adapter (Note 7)
- P/N 1830818 Station Protection Kit, Gas (Note 4)
- P/N 5252899 Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

#### Notes

1. Coax wire and one connector kit (includes two connectors P/N 1836446) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N 2577672 or two P/N 1833108 cable assemblies together.

SUPPLIES (NONE)

## 3279 COLOR DISPLAY CONSOLE MODEL 2C

### PURPOSE

A cathode-ray tube (CRT) Color Display Console which attaches to the 4331/4341/4361/4381 Processors and provides for operator interaction for both normal operations and maintenance. An Operator Console Keyboard with an operator control panel is available with the primary Display Console and is the means to Power On (4341 -- see "Special Features") Power Off, Initial Microcode Load (IML), and Start or Stop processor operations.

### MODEL 2C

#### Model 2C C02

**Prerequisites:** An available console position on any 4331/4341 Mdl Group 1 or 4331/4341 Mdl Group 2 See 4331/4341/4361/4381.

The 3279-2Cs require an Operator Console Keyboard. The 3279-2C that is used as the primary console on a 4331/4341 Mdl Group 1/4341 Mdl Group 2 must have an Operator Console Keyboard with an operator control panel.

### HIGHLIGHTS

Displays characters in a 9x12 character matrix (uppercase alphabet is displayed in a 7x9 matrix), arranged in 24 rows of 80 characters each. Rows 1 through 20 are usable by the operator, rows 21 through 24 are used for system status information. A 96-character set is used, which consists of 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters, plus space and null.

Console messages are displayed in four colors (white, red, blue, or green) according to the status of the protected and intensified attributes. This gives the operator better perception of the system status.

When the 4300 is under control of VM/SP, the screen input area is green and the output area is blue. Input data that is re-displayed in the output area may be made white with the CP TERMINAL HIGHLIGHT ON command. In addition, messages from other users are displayed white.

In addition to Power On/Off, IML and Start/Stop, the console allows the operator to manually control such functions as storage display and operation, address comparing, and normal versus instruction step processing. The console indicates to the operator both proper operations and malfunctions, should they occur.

For maintenance and service support the console can display the status of the Processor complex and other valuable servicing information. It also provides a means for using diagnostic tools.

The 3279 mdl 2C that is used as the primary console is normally installed concurrent with the installation of the 4331/4341/4361/4381 Processors.

**Operator Factors:** The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols and/or words on the bottom row of the screen. These symbols, except those indicating color attributes, will appear in blue. The keyboard, which is low in profile, provides a palm rest area and has separators to help prevent accidental striking of control keys. The cursor is displayed in white on the 3279. A base color switch allows the 3279 mdl 2C to run in monochrome mode for 3278 compatibility. In this mode fields are displayed in green for normal intensity and in white for high intensity. For comfortable viewing the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees or 20 degrees from the vertical. The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern.

**Editing:** Cursor move, tab, home, back tab, insert, delete, erase to end-of-field and erase all input keys are basic to the console keyboard. Alphanumeric, special symbol and cursor move keys have typamatic capability. 12 Program Function (PF) keys are basic.

**Audible Alarm:** An alarm sounded under program control to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next-to-last position on the screen. The operator may adjust the volume of the tone.

**Security Function:** The Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the "on" position.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide high availability to the customer. This high availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the "User Reference Summary".

#### Base Color Supported:

Protected and intensified -- White  
 Unprotected and intensified -- Red  
 Protected and normal intensity -- Blue  
 Unprotected and normal intensity -- Green

**Keyboards:** Refer to Type Catalog for a picture of the Keyboard layouts. Limitations: Keyboards used on 3279-2C are not interchangeable with keyboards used on 3279 mdls 2A, 2B, 3A and 3B. Maximum: One of the below. Field Installation: No.

Contact your country Special Product Marketing Representative for RPQ Keyboard descriptions.

### SPECIFY

**Basic Configuration:** The 3279 mdl 2C will be shipped with these specifications unless alternative codes are specified:

**Cabling:** Fixed-length 7.6m (25 ft) cables from the Display Console to the Processor for Keyboards #4631, #4632 and #4634 will be furnished by IBM and shipped with the processor. For Keyboard #4633, up to 30.5m (100 ft) of signal cable is provided by IBM and ordered via normal procedures. Additional cable for this feature up to a maximum total cable length of 1,500m (4,925 ft) must be provided by the customer as outlined in the 3279-2C specifications page in "IBM Input/Output Equipment Installation Manual - Physical Planning: System/360, System/370, 4300 Processors", GC22-7064 and "Installation and Assembly of Coaxial Cable and Accessories for Attachment to IBM Products", GA27-2805.

- Power Cable Length:
- Power (AC, 1-phase, 50/60 Hz): Specify #2998 and one of the following: #2804 for input voltages between 100V and 120V. If 127V is required, specify #2820 (not Japan). Specify #2806 for input voltages between 200V and 230V. If 240V is required, specify #2801 (not Brazil or Japan).

**Note:** Canada must specify #2804.

For Canada only, specify #9890 for locking plug (60 Hz, 120V, 1-phase). Canada will use the same line cord and plugs as the US.

For Japan only, all mdls will be supplied with locking plug for voltages under 200V. Specify #9891 for non-locking plug.

Plugs: The 3-digit country code (except Canada and Japan) on the DPMO sheet will be used to select a power plug which matches the most commonly used power supply in each

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country. If an exception is required, a country RPQ may be initiated.

- **Power Cable:** If the standard 2.8 meter (9 foot) power cable is not desired, specify: #9513 for 4.5m (15 ft).
- **Power Cable Plug:** If the most commonly used plug in that country is not desired, then a country RPQ may be initiated. For details concerning power plugs, refer to "IBM 3270 Information Display System Installation Manual - Physical Planning", GA27-2787.

**Note:** If a power supply, not the most common, is specified and it is incompatible with the power plug commonly supported, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

- The machine nomenclature, character set and Keyboard language defaults for the following countries are Spanish Speaking unless otherwise noted.

Argentina	Honduras
Bolivia	Mexico
Chile	Nicaragua
Colombia	Panama
Costa Rica	Paraguay
Dominican Republic	Peru
El Salvador	Uruguay
Ecuador	Venezuela
Guatemala	

Country	Nomenclature	Character Set & Keyboard Language
Brazil	Brazilian	Brazilian
Japan	Japanese	Specify Device Code
Canada	Canadian Bilingual	English US
Others	English	English US

For all countries, if another language is required, specify as follows:

Brazilian #2975  
Canadian/French #2977  
EBCDIC #2951  
English UK #2958  
English US #2956  
International #2950  
Japanese English #2955 (1)  
Japanese Katakana #2973 (2)  
Spanish Speaking #2969

**Note 1:** Japanese English applies to Keyboards #2720, #2727, #2728, and #2729.

**Note 2:** Japanese Katakana applies to Keyboards #2720 only.

**Note:** Character Set Language, and Operator Control Panel and System Function Keys Nomenclature are automatically generated by the Keyboard Language Specify.

## SPECIAL FEATURES

**76-Key Jap. Op. Con. KB, W/O Chan.-to-Chan. or Power On (#2720):** (4331 only) Same as #2727 but the operator control panel does not have the Channel-to-Channel control key, the Channel-to-Channel Disabled Indicator, or the Power On key. Prerequisites: #2955 or #2973.

**76-Key Jap. Eng. Op. Con. KB, with Chan.-to-Chan. (#2727):** (4341 and 4381 only) Typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate Shift key. Provides 50 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power

On/IML, Channel-to-Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, Channel-to-Channel Disabled). Channel-to-Channel is required for systems having a channel-to-channel adapter feature. Prerequisites: #2955.

**76-Key Jap. Eng. Op. Con. KB, W/O Chan.-to-Chan. (#2728):** (4341 and 4381 only) Same as the #2727 but the operator control panel does not have the Channel-to-Channel control key or the Channel-to-Channel Disabled indicator. Prerequisites: #2955.

**76-Key Jap. Eng. Op. Con. KB (#2729):** (4341 and 4381 only) Same as #2727 but without an operator control panel. Prerequisites: #2955.

**75-Key Op. Con. KB with Chan.-to-Chan. (#4631):** (4341 and 4381 only) Typewriter-like layout, movable, with 12 PF keys available on the top row through use of the Alternate Shift key. Provides 49 data keys and 26 control keys, and contains an operator control panel with 4 control keys (Power Off, Lamp Test, Power On/IML, Channel-to-Channel) and 6 LED indicators (Basic Check, System, Wait, Power in Process, Power Complete, Channel-to-Channel Disabled). Channel-to-Channel is required for systems having a channel-to-channel adapter feature. Specify: Optional Language if required.

**75-Key Op. Con. KB, W/O Chan.-to-Chan. (#4632):** (4341 and 4381 only) Same as #4631 but the operator control panel does not have the Channel-to-Channel control key or the Channel-to-Channel Disabled Indicator. Specify: Optional Language if required.

**75-Key Op. Con. KB (#4633):** (4341 and 4381 only) Same as #4631 but without an operator control panel. Specify: Optional Language if required.

**75-Key Op. Con. KB, W/O Chan.-to-Chan. or Power On (#4634):** (4331 or 4381 only) Same as #4631 but the operator control panel does not have the Channel-to-Channel control key, or the Channel-to-Channel Disabled Indicator or the Power On key. Prerequisites: Keyboard Language "Specify".

**Cabling:** Cables will be furnished by IBM for Features #2727, #2728, #2729, #4631, #4632 and #4634. For Features #2729 and #4633 the cables must be supplied by the customer as outlined for the 3279 mdl 2C in the "IBM 3270 Information Display System Installation Manual Physical Planning", GA27-2787.

**(Canada only) > Waterproof Power Connector (#8802):** Provides a waterproof connector on the power cable to satisfy local ordinances requiring this type of termination in specific locations. Limitations: Available only for power cord lengths of 1.8m (6 ft) #9511, or 4.5m (15 ft) #9513. Maximum: One. Field Installation: No.<

## MODEL CONVERSIONS

Not recommended for field installation.

## ACCESSORIES

Refer to M4300 pages for information pertaining to the 4300 Processors Console Table.

**Battery, Lithium P/N (6042018):** This supply item is a 3.0 volt non-rechargeable lithium battery which provides power to sustain the convergence parameters in a 3279 when normal power is not present. Field Installation: Yes, by customer. Note: Discharged batteries should be returned to IBM for disposal. The return information is printed on the label. Ordering Information: Contact IBM.

**Keyboard Overlay (P/N 1742762):** A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

88-Keyboard Overlay P/N 1742781

**Keys (P/N 2577741):** The 3279, with Security Keylock, is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys only to original purchaser). A letter of authorization, with key identification, must accompany each order. Allow two to three weeks for delivery.

**3279 Display Station Tilt/Rotate Accessory (P/N 4422265):** An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position.

This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement. For the countries in which it is released, the Tilt Rotate Accessory is an NDD Product. **Warranty:** The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days. **Maintenance:** There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available. **Customer Responsibility:** The customer is responsible for mounting the Display Station on this accessory.

**SUPPLIES (NONE)**

## 3279 COLOR DISPLAY STATION MODEL S2A

### PURPOSE

A high quality color cathode ray tube (CRT) display station used in clusters with the 3274, the 3276, or the 4331 Processor for displaying alphanumeric data and presentation graphics data, and for entering data into and receiving data from a S/3, S/360, S/370, 30XX, 4300 or 8100 Information System, or 4700 Finance Communication System. In base color mode on all models, data fields can be displayed in four colors. A keyboard, selector light-pen, or both, permit an operator to display and manipulate data on the screen in a flexible and efficient manner.

On extended color models S2B, S3G, 02X or 03X with Extended Function feature, attached to a 3274, data may be displayed at both character and field level in seven colors with a choice of highlighting modes. APL/Text is provided. On extended color model S3G, or 03X with the requisite optional features, customer specified symbols and shapes may be displayed in any character position using Programmed Symbols. With its set of basic and extended models, the 3279 meets both general purpose and unique display requirements.

### MODELS S2A, S2B, S3G, 02X, 03X

(Canada only> Model S2A: Base Color -- Displays up to 1,920 characters in 24 lines of 80 characters each.

Model S2B: Extended Color -- Displays up to 1,920 characters in 24 lines of 80 characters each. Seven colors, extended highlighting and APL.

Model S3G: Extended Color Programmed Symbols -- Displays up to 2,560 characters in 32 lines of 80 characters each. Seven colors, extended highlighting and APL, and programmed symbols.<)

Model 02X: Custom Model -- Displays up to 1,920 characters in 24 lines of 80 characters each.

Model 03X: Custom Model -- Displays up to 2,560 characters in 32 lines of 80 characters each.

For use with 8100 Information System, see the "8100 System Configurator", GA27-2876. For use with 4700 System, refer to M4701 pages. Note: Mdls S2B, S3G, and 03X are not supported by System/3.

Prerequisites: 3279 requires a keyboard and a 3274, 3276, 4321 or 4331 -- see M3274, 3276, or 4331 pages.

Customer Setup (CSU): The 3279 is designated Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

- Characters are displayed within a 9x12 character matrix on all mdls. On all mdls the basic 26-character uppercase letters are presented in 7x9 character matrix. A 94-character set is displayed, consisting of 26 uppercase alphabetic, 26 lowercase alphabetic, 10 numeric and 32 special characters. A monospace switch provides the capability of switching to uppercase alphanumeric mode. The 3279 uses 3270 field formatting capability that permits individual fields of data on the screen to be program defined with various attributes, such as protected/unprotected, normal/intensified, displayable/non-displayable, and selector light-pen detection allowed/disallowed. An audible alarm is provided.
- All 3279 mdls use the 3270 field attributes of protect and intensify for the additional purpose of displaying individual fields in base colors according to the following table:

Protected and intensified -- White  
Unprotected and intensified -- Red  
Protected and normal intensity -- Blue  
Unprotected and normal intensity -- Green

- Extensions to 3270 datastream supported by appropriate 3274 features and by 3279 mdls S2B, S3G, 02X and 03X provide the following field and character attributes:
    - Extended Color (red, blue, green, white, yellow, turquoise and pink).
    - Extended Highlighting (reverse video, blink, underscore).
    - Programmed Symbols (six sets with 190 loadable positions each). (Mdl S3G or 03X with extended function feature #3850.)
  - Each attribute can be specified independently of any other. Special keyboards are provided to allow operator control of these attributes.
  - Programmed Symbols can use the whole character matrix for symbol definition. In addition, three of the sets of Programmed Symbols allow symbols and shapes to be displayed using multiple colors within a single character location.
  - (Canada only> 3270 Personal Computer Attachment enables the IBM Personal Computer, 5150, to be attached to the 3279 mdls S2A, S2B, S3G, 02X, 03X. The 3279 and associated keyboard become common to both the host processor and to the IBM Personal Computer, thus expanding the use of the display station and the applications available at the display station - see "Special Features"<)
  - 3279 mdls(Canada only> S2B, S3G, or mdls<) 02X or 03X with optional feature, provide Extended Color, Extended Highlighting and APL/Text. 3279 mdls(Canada only> S2B, S3G,<) 02X and 03X are supported on 3274 mdls 1A, 1C, 1D, 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C and on the 3276 for APL/Text operation.
  - APL/Text capability provides for display of a 222-character APL/Text character set including the 94/116/127 character EBCDIC set. An appropriate keyboard is available.
  - APL/Text requires a 3274 mdl X1A, X1C, or X1D customized to include the APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function Base feature. APL/Text operates in EBCDIC mode only and is NOT compatible with ASCII.
  - For Extended Color and Extended Highlighting on the 3279 mdls S2B, S3G, 02X and 03X, the Structured Field and Attribute Processing option of Configuration Support C or D is required on the 3274. The 3279 PS feature requires, in addition, the Programmed Symbols option of 3274 Configuration Support C or D. Extended Color, Extended Highlighting and PS function operate in EBCDIC mode only and are not compatible with ASCII. The 3279 mdl S2A, or mdl 02X without special features, will attach to the Display/Printer Adapter of the 4331 Processor.
  - For base color mode of operation, all mdls of the 3279 will attach to all models of the 3274. Configuration Support on the 3274 must be at the following level or higher:
    - Configuration Support A - Release 11.0
    - Configuration Support C
    - Configuration Support D
    - Configuration Support T
- (Canada only> Configuration Support C must be at Release 46.0 or higher to support 3279 models S2B and 02X shipped from June 1983 and 3279 models S3G or 03X shipped from January 1984. These machines are identified by a "-1" after the model number (e.g. S3G-1).<)

- On the 3276 for base color mode, 3279 mdls S2A, S2B, 02X will attach to all 3276 mdls except mdl 1, and 3279 mdls S3G or 03X will attach to all 3276 mdls except mdls 1 and 2.
- The operator may initiate a local display-to-printer (monochrome or color 3287) copy function (i.e., without host intervention) from the keyboard of a 3279 (except for graphics use of PS). When the 3279 is attached to a 3274, the printer designation is controlled by operator use of the IDENT key and by:
  1. A printer authorization matrix which is loaded into the 3274 through a user-written host application program, or
  2. A customer-definable matrix loaded from the System Diskette at IML time. For further details, see the "IBM 3270 Information Display System Planning and Setup Guide", GA27-2827.
  3. When the 3279 is attached to a 3276, the printer designation is controlled by operator use of the IDENT key and by a configuration default matrix. This matrix is determined by the relative positions of devices attached to the 3276.

**Operator Factors:** The 3279 has an anti-glare screen to improve contrast and readability. Indicators are displayed in symbols on the bottom row of the screen outside the data area, and provide useful operator information. These symbols, except those indicating color attributes, will appear in blue. Display of data on the screen is accomplished without refresh interrupt (except that transient patterns are displayed when data is being loaded to the Programmed Symbols buffers). The keyboard, provides a palm rest area and has separators to help prevent accidental striking of control keys. The operator may select one of several cursor modes. The cursor is displayed in white on the 3279.

A base color switch allows the 3279 to run in "monochrome mode". In this mode, fields are displayed in green for normal intensity and white for high intensity. When extended color attributes are specified, the switch setting is ignored. Extended color will be displayed for those fields and characters for which it is specified. Other fields and characters will be displayed in green with white for high intensity.

For comfortable viewing, the CRT face is inclined and may be adjusted to 15 degrees, 17.5 degrees or 20 degrees from the vertical. A tilt/rotate accessory (P/N 4422265) increases this range of adjustment.

The operator may adjust the color convergence quickly and easily using a simple keyboard procedure with a special screen test pattern. (Canada only) This convergence procedure is not available on machines which have model numbers ending in -1 (e.g., S2A-1). These machines have their convergence set in the factory and no further adjustment by the operator will be required.<)

**Editing Functions:** Cursor move, tab, home key, back tab, insert, delete, extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen) and cursor select keys are all basic for 3279 displays. All alphameric, special symbol and cursor move keys have repeat action capability. Double speed cursor repeat action is attained with simultaneous depressing of the ALT key and a horizontal cursor positioning key.

**Input Flexibility:** A choice of keyboards on all mdls, and/or the selector light-pen on the mdls 02X and 03X provide input flexibility - see "Special Features" and "Accessories" below. Fields of data can be selected by positioning the cursor and operating the cursor select key, instead of using the selector light-pen. 12 Program Function (PF) keys are provided with all typewriter keyboards. When attached to a 3274 with Configuration Support C with Entry Assist RPQ or with Configuration Support D with Entry Assist and with a Typewriter or APL keyboard, the display provides capabilities which facilitate operator entry and editing of text material. The capabilities include margins, tabbing, word-wrap, improved cursor positioning, improved character/word delete, cursor position indicator and an audible end-of-line warning tone. Entry Assist is intended

for use primarily with a specific set of host editor programs. See M3274 pages for languages supported. See "Accessories" for 3274 Entry Assist Keytop kits.

Keyboards #2715, #2716, #2717, #2718, #4621, #4622, #4623, #4626, #4627, #4629 are supplied with Keyboard Numeric Lock function which provides the ability to lock the keyboard if a non-numeric key (other than 0-9, minus, decimal sign or dup) is operated in a pre-defined numeric-only field. Numeric lock function is enabled on keyboards #2708, #2719, #2721, #4640, #4651, #4652 as an option of 3274 customization, in which case these keyboards will either all have, or all not have, the numeric lock function. Limitations: Each 3279 must be equipped with a keyboard. Keyboards used on 3275/3277 machines are not interchangeable with keyboards used on 3276/3278/3279 machines. Field Installation: Yes. The keyboard is set up by the customer. Some keyboards may require pre-requisites which are not customer-installable. A 0.9m (3 ft) cable is provided as standard.

**Overlay and Attribute Select Keyboards:** These keyboards are equipped with highlight, PS and color select function keys (12 PF keys on right-hand side of keyboard). They provide operator selection under program control of highlight, PS and color attributes. Except for the color marking and annotation on the 12 PF keys on the right-hand side of the keyboard, the Overlay and Attribute Select keyboards appear identical to the equivalent non-Overlay and non-Attribute Select keyboards. Use of keys to select a feature not on the display will cause an error indication in the operator guidance row on the display. The uppercase and alternative shift of these 12 PF keys are used for attribute selection and are, therefore, not available for normal program function use. Limitations: Attribute Selection is not supported for keyboards on a 3279 attached to a 3276.

**Security Functions:** A special non-displayed input mode provides for fields of data to be program-defined so that they will accept data entered from the keyboard without displaying the data on the screen. A Security Keylock prevents modification or display of data in the display terminal unless the key is turned to the ON position. These capabilities, and the terminal's ability to identify itself to the host program, allow customer-supplied security program routines to help control access to data and aid audit of actions. A Magnetic Slot Reader (optional on 3279 mdls 02X or 03X only), or for a 3279 attached to a 3274, a Magnetic Hand Scanner (optional on 3279 mdls 02X or 03X only), are available to enter system user identification data.

**Audible Alarm:** An alarm, sounded under program control, to alert the operator to a special condition. This alarm, during keyboard operation, is also sounded when a character is entered into the next to last position on the screen. The operator may adjust the volume of the tone.

When attached to a 4331 Processor via the Display/Printer Adapter, functional support varies from that of the 3279 attached to a 3274 or 3276. See M4331 Display/Printer Adapter feature description for details of support.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This increased availability has been achieved through the use of problem determination and recovery procedures that are easily understood and used by the operator. The procedures are provided by the "User Reference Summary". Also, see "Customer Responsibilities".

Display Exception Monitoring Facility (DEMF) and the Program Product, Network Problem Determination Application (NPDA), are software tools for network problem determination/isolation which can enhance the availability and serviceability of the terminals. See "DEMF" in the SCP section for OS/VS1 and OS/VS2 (MVS), and 5735-XX8 in the PP section for NPDA.

#### Customer Responsibilities:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 3279.

- Physical setup, connection of cables in customer access areas, switch setting and check out.
- Contacting CE to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
- Notifying IBM of intent to relocate, and following IBM instructions for relocation.
- Using and following the problem determination procedures and filling out trouble report prior to calling for IBM service.
- Disconnection, packing and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

Refer to 3274 control storage requirement tables to ensure that adequate storage is available if required.

**Publications:** See "KWIC Index", G320-1621, or specific system bibliography.

**Basic Configuration:** The 3279 mdls S2A, S2B and S3G are only available with the following specifications. The 3279 mdls 02X and 03X will be shipped with these specifications unless alternative codes are specified.

- Power cable length: 9 foot.
- Cables - see "Accessories" for cable ordering information.
- The 3-digit Country Code entered on the DPMO Sheet will be used to select the most commonly used power plug in that country.

### SPECIFY

- Power (AC 1-phase, 50/60 Hz). Specify #2998 and one of the following:
  - #2804 for input voltages between 100V and 120V.
  - If 127V is required, specify #2820 (not Japan).

Specify #2806 for input voltages between 200V and 230V. If 240V is required, specify #2801 (not Brazil or Japan). Canada must specify #2804.
- Canada only, specify #9890 for locking plug (60 Hz, 120V, 1-phase). Canada will use the same power cord and plugs as the US.
- For Japan only, for voltages under 200V, all mdls will be supplied with locking plug. Specify #9891 for non-locking plug if required.
- Power Cable: 3279 mdls 02X or 03X only, if the standard 2.8m (9 ft) power cable is not desired, specify: #9513 for 4.5m (15 ft).
- Power cable plug: 3279 mdls 02X or 03X only, if locking plug required, specify #9890. If the most commonly used power cable plug in the country is not desired, then a country RPQ may be initiated. For details concerning power plugs, refer to "IBM 3270 Information Display System Installation Manual - Physical Planning", GA27-2787. If a power supply, not the most common, is specified and it is incompatible with the power plug commonly supported, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.
- Machine nomenclature, character set and keyboard language: Defaults are as follows:

Country	Nomen- clature	Character Set and K/B Lang.
Argentina	Sp. Spkng	Sp. Spkng
Bolivia	Sp. Spkng	Sp. Spkng
Chile	Sp. Spkng	Sp. Spkng

Colombia	Sp. Spkng	Sp. Spkng
Costa Rica	Sp. Spkng	Sp. Spkng
Dominican R.	Sp. Spkng	Sp. Spkng
El Salvador	Sp. Spkng	Sp. Spkng
Ecuador	Sp. Spkng	Sp. Spkng
Guatemala	Sp. Spkng	Sp. Spkng
Honduras	Sp. Spkng	Sp. Spkng
Mexico	Sp. Spkng	Sp. Spkng
Nicaragua	Sp. Spkng	Sp. Spkng
Panama	Sp. Spkng	Sp. Spkng
Paraguay	Sp. Spkng	Sp. Spkng
Peru	Sp. Spkng	Sp. Spkng
Uruguay	Sp. Spkng	Sp. Spkng
Venezuela	Sp. Spkng	Sp. Spkng
Brazil	Brazilian	Brazilian
Japan	Japanese	Specify Code
Canada	Can. Biling.	English US
Others	English	English US

- Keyboard language and character set: For all countries, if another language is required, specify as follows:

Brazilian #2975  
Canadian/French #2977  
EBCDIC #2951  
English UK #2958  
English US #2956  
International #2950  
Japanese English #2955 (1)  
Japanese Katakana #2973 (2)  
Spanish Speaking #2969

- Japanese English applies only to keyboards #2708, #2715, #2717, #2718, #2719, #2721, #4622, #4623.
- Japanese Katakana applies only to keyboards #2708, #2715, #2716, #2717, #2718, #2719, #2721.

- Katakana Support: 127 characters (plus space and null). Support is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be 3270 compatible for customers using the NL and EM codes. Customers who do not use these codes will be 3274 and 3276 compatible. For details, see appropriate SRLs.
- Keyboard Language: All 3279s in a 3274/3276 cluster must specify the same keyboard language as that used on the 3274/3276. The keyboard language for 3279s on a 4331 must correspond with one of the language options specified on the 4331.

### SPECIAL FEATURES

(Canada only> IBM Personal Computer Adapter (#5322, #5325, #5326, #5327, #5328): (Features #5325, #5326, #5327, and #5328 are NO LONGER AVAILABLE). This entry is for information purposes only -- see Product Announcement Letter. <) (Canada only> for ordering instructions and prices. Provides the capability of attaching an IBM Personal Computer, 5150, System Unit to the 3279. For 3279 mdls S2A, S2B, 02X with serial numbers below E0000 order #5325 and for serial numbers above E0000 order #5326. For 3279 mdls S3G and 03X with serial numbers below M0000 order #5325 and with serial numbers above M0000 order #5326. #5325 and #5326 contains material for both the 3279 and the IBM Personal Computer System Unit. If only the 3279 portion is required, then for the ranges of 3279 serial numbers quoted, order #5327 or #5328 respectively. If only the IBM Personal Computer 5150 portion is required, order #5322. The interconnection cables and user's guide with the Programming Diskette are included with the Personal Computer option #5322. A user's guide without the Programming Diskette may be ordered from Mechanicsburg, PA using Form SA23-0169. Maximum: One. Prerequisites: (1) 3279 mdls S2A or S2B or S3G or 02X or 03X. (2a) IBM Personal Computer, 5150, X14, X64, or X74 with Color/Graphics Monitor Adapter, or (2b) IBM Personal Computer System Unit, 5150 with Color/Graphics Monitor Adapter, 5-1/4 inch

Diskette Drive Adapter and one 5-1/4 inch Diskette Drive, and at least 64KB total user memory. (3) IBM Personal Computer DOS 1.1 or DOS 2.0. (4) a 3274 or 3276 control unit. Limitations: Cannot be installed with #4999, #6360 or #8750 — also see M3274 pages. Field Installation: Yes (only). Contact < (Canada only) > CE < (Canada only) > for installation. For installation of the feature on other 3279 mdls, refer to other M3279 pages. < )

**Programmed Symbols (#5790):** (Provided with 3279 mdl S3G) This feature provides storage and accessing for up to six 190-symbol sets whose shapes and codes are customer-definable. Symbol sets are loaded under program control and accessed for display through programming or by an operator from the display keyboard. The number of symbols in any one set that can be accessed from the display keyboard is 94 or 116 for Canadian French, or 127 for Japanese Katakana, plus space. Prerequisites: 3279 mdl 03X with #3850. Maximum: One. Field Installation: Yes, on 3279 mdl 03X only. Limitations: (Canada only) > Mutually exclusive with Magnetic Reader Control #4999. See Note 1 under #4999, below. < ) Can be used only with a 3274 having the PS Control and Structured Field and Attribute Processing options of Configuration Support C or D. Transient patterns are displayed when data is being loaded to the Programmed Symbols buffers. Corequisites: If display operator access to PS is required, one of the following keyboards must be ordered:

- 87-key EBCDIC Typewriter Overlay Keyboard (#4640).
- 87-key EBCDIC Attribute Select Typewriter Keyboard (#4651) or 87-key EBCDIC Attribute Select Typewriter/APL Keyboard (#4652).
- 88-key Attribute Select Japanese English/Japanese Katakana Typewriter Keyboard (#2708).
- 88-key Japanese English/Japanese Katakana Typewriter Overlay Keyboard (#2719).
- 88-key Attribute Select Japanese English/Japanese Katakana Typewriter/APL Keyboard (#2721)

### THE FOLLOWING SPECIAL FEATURES ARE ONLY AVAILABLE ON THE 3279 MDL 02X OR 03X

**Inhibit Keyboard Numeric Lock (#4691):** This feature prevents the action of the Keyboard Numeric Lock function which is described at the beginning of the keyboard section. Prerequisites: 3279 mdls 02X or 03X only, and at least one of the following keyboards: #2715, #2716, #2717, #2718, #4621, #4622, #4623, #4626, #4627, #4629. Maximum: One. Field Installation: Yes. Contact CE for installation. MES Number 999999 is to be used for IR (incident report) completion data.

**Extended Function (#3850):** (Provided with 3279 mdls S2B and S3G) This feature provides Extended Color (red, blue, green, white, yellow, turquoise and pink) and Extended Highlighting (reverse video, blink, underscore). It also provides capability for display of 222 character APL/Text character set including the 94/116/127 character EBCDIC set. Prerequisites: 3279 mdls 02X or 03X. Maximum: One. Field Installation: Yes, on 3279 mdls 02X and 03X only. Limitations: APL/Text requires a 3274 mdl X1A, X1C, or X1D, customized to include APL/Text control function, or a 3276 with APL/Text control feature and its prerequisite, Extended Function feature. Extended Color and Extended Highlighting require the Structured Field and Attribute Processing option of Configuration Support C or D on the 3274.

**Magnetic Reader Control (#4999):** Provides the capability of attaching a Magnetic Slot Reader or a Magnetic Hand Scanner which read encoded information from a magnetic stripe. The MSR can be used when the 3279 is connected to either a 3274 or 3276, but the MHS can only be used when the 3279 is connected to a 3274 Control Unit. Prerequisites: 3279 mdls 02X and 03X. (Canada only) > Limitations: Mutually exclusive with Programmed Symbols #5790. See Note 1 below. < ) Maximum: One. Field Installation: Yes, on 3279 mdls 02X and 03X only. (Canada only) > Limitations: Cannot be installed with #5325 or #5326. < )

**Selector Light-Pen (#6360):** Hand-held, pen-like device which permits the operator to select fields of data from a display for input to the host system. The selector light-pen will detect on any color. The selector light-pen, while not being used, can be placed in a recess of the keyboard which is provided for user's incidental items. Se-

lector light-pen (and cursor select) operations have been expanded to include a designator character '&'. When this designator is used, the Read Modified operation returns both the addresses and the data of all modified fields on the screen. Prerequisites: 3279 mdls 02X and 03X. Maximum: One. Field Installation: Yes, on 3279 mdls 02X and 03X only. (Canada only) > Limitations: Cannot be installed with #5325 or #5326. < )

**Video Output (RPQ 7J0039):** (Canada only) > Note 1. This limitation does not apply to field installation on machines below serial number M0000. These features are available for concurrent installation by RPQ 7J0089 factory only. < )

### Summary of Special Feature Availability:

Special Features	No.	3279 Mdls					
		S	S	S	O	O	
		2	2	3	2	3	
		A	B	G	X	X	
Magnetic Reader Ctrl	#4999	N	N	N	O	O	
Programmed Symbols	#5790	N	N	S	N	O	(1)
Selector Light Pen	#6360	N	N	N	O	O	
Video Output	#8750	N	N	N	N	O	
Inhibit K/B Numlock	#4691	N	N	N	O	O	
Extended Function	#3850	N	S	S	O	O	
IBM Personal	#5325	O	O	O	O	O	
Computer Adapter	#5326	O	O	O	O	O	

N = Not Available

S = Standard

O = Optional

(1) Prerequisites: #3850.

**88-key Attribute Sel. Jap. Eng./Jap. Kat. T/W KB (#2708):** Typewriter layout, movable, similar to the 88-key Japanese English and Japanese Katakana typewriter keyboards (#2717). Attribute select functions are shown on the 12 PF keys at the right-hand side of these keyboards. Prerequisites: 3279 mdls 02X or 03X with #3850 and #2955 or #2973. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**76-key Jap. Eng./Jap. Kat. T/W KB (#2715):** Typewriter-like layout, movable. 12 PF keys are available in the top row of data keys through use of an alternative shift key. The 76-key Japanese English Typewriter Keyboard provides 49 data keys and 27 control keys. Prerequisites: #2955 or #2973.

**76-key Jap. Kat. Data Entry KB (#2716):** Movable, 4-level shift providing 49 data keys, 10 PF keys and 27 control keys. Prerequisites: #2973.

**88-key Jap. Eng./Jap. Kat. T/W KB (#2717):** Typewriter-like layout, movable, with 49 data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are available in the top row of data keys through the use of the alternate shift key. The Japanese Katakana keyboard provides 4-level shift, 49 data keys and 27 control keys. Prerequisites: #2955 or #2973.

**88-key Jap. Eng./Jap. Kat. T/W/APL KB (#2718):** An 88-key Japanese English/Japanese Katakana Typewriter Keyboard (see #2717) with modified keytops to allow entry of 81 APL-specific characters in addition to the basic character set Japanese English or Japanese Katakana. An APL ON/OFF key controls whether the keyboard is in APL or basic character set mode. In contrast to the 88-key Japanese English/Japanese Katakana Typewriter Keyboard without APL (see #2717), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: 3279 mdls 02X or 03X with #3850 and #2955 or #2973.

**88-key Jap. Eng./Jap. Kat. T/W Overlay KB (#2719):** This keyboard, without overlay, has the same layout and can be used in the same way as the 88-key Japanese English/Japanese Katakana Typewriter Keyboard (see #2717). This keyboard, however, has special narrow keytops to permit the use of customer-annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES (see "Accessories"). These overlays are used

to show the symbols associated with the keys when one of the sets of Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys in uppercase and alternative shift on this keyboard. Overlay keyboards are equipped with highlight, PS and color select function keys. (12 PF keys on the right-hand side of the keyboard.) Prerequisites: #2955 or #2973. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**88-key Attribute Sel. Jap. Eng./Jap. Kat. T/W/APL KB (#2721)** Typewriter layout, movable, similar to the 88-key Japanese English and Japanese Katakana Typewriter/APL Keyboard (#2718). Attribute select functions are shown on the 12 PF keys at the right-hand side of these keyboards. Prerequisites: 3279 mdls 02X or 03X with #3850 and #2955 or #2973. Limitations: Cannot be installed on a 3279 that is attached to a 3276.

**75-key EBCDIC Typewriter KB (#4621)** Typewriter-like layout, movable, with 49 data keys and 26 control keys. 12 PF keys are included in the top row of data keys through of an ALT shift key. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**75-key EBCDIC Data Entry KB (#4622)** Movable, with 35 data keys, 10 PF keys and 30 control keys. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**75-key EBCDIC Data Entry KB (#4623)** Keypunch layout, with 35 data keys, 10 PF keys and 30 control keys. This is the recommended keyboard for high speed data entry. Prerequisites: 3279 mdl 02X or 03X. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**87-key EBCDIC Typewriter/APL KB (#4626)** An 87-key EBCDIC Typewriter Keyboard (#4627) with modified keytops to allow entry of 81 APL-specific characters in addition to the 94-character EBCDIC set. An APL ON/OFF key controls whether the keyboard is in EBCDIC typewriter or APL mode. In contrast to the 87-key EBCDIC Typewriter Keyboard without APL (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard area. Prerequisites: 3279. mdls 02X or 03X with #3850. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**87-key EBCDIC Typewriter KB (#4627)** Typewriter-like layout, movable, with 49 alphanumeric data keys, 26 control keys and 12 PF keys (24 total PF keys). 12 of the PF keys are included in the top row of data keys through the use of the ALT shift key. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**87-key EBCDIC Typewriter/Text KB (#4629)** An 87-key EBCDIC Typewriter Keyboard (see #4627) with modified keytops to allow entry of 65 text-specific characters in addition to the 94-character EBCDIC set. A Text ON/OFF key controls whether the keyboard is in EBCDIC typewriter or Text mode. In contrast to an 87-key EBCDIC Typewriter Keyboard without Text (see #4627), this keyboard has only 12 PF keys (PF1 through PF12) which are the group of 12 keys to the right of the main keyboard areas. Prerequisites: 3279 mdl 02X or 03X with #3850. Keyboard language - English US (#2956) only.

**87-key EBCDIC Typewriter Overlay KB (#4640)** This keyboard, without overlay, has the same layout and can be used in the same way as the 87-key EBCDIC Typewriter Keyboard (see #4627) with the 94-character EBCDIC set. This keyboard, however, has special narrow keytops that permit the use of customer annotated overlays. Six overlays are supplied with each keyboard. Additional overlays can be obtained via MES (see "Accessories"). These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired PS can be selected by the operator through use of the appropriate PF keys (12 PF keys on the right-hand side of the keyboard) in uppercase and alternate shift of this keyboard. Prerequisites: 3279 mdls 02X and 03X. Limitations: Cannot be installed on a 3279 attached to a 3276. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**87-key EBCDIC Attribute Select Typewriter KB (#4651)** A typewriter layout, movable, similar to the 87-key EBCDIC typewriter keyboard (#4627). Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. Prerequisites: 3279 mdls 02X or 03X with #3850. Limitations: Cannot be installed on a 3279 attached to a 3276. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

**87-key EBCDIC Attribute Select Typewriter/APL KB (#4652)** A typewriter layout, movable keyboard, similar to the 87-key EBCDIC typewriter/APL keyboard (#4626). Attribute select functions are shown on the 12 PF keys at the right-hand side of the keyboard. Prerequisites: 3279 mdls 02X or 03X with #3850. Limitations: Cannot be installed on a 3279 attached to a 3276. (Except Japan>Specify optional language if required.<) (Japan only>Specify language required.<)

## MODEL CONVERSIONS

MES orders to change models S2A or S2B to 02X and S3G to 03X will be accepted 90 days after installation.

From/To	S2A	S2B	S3G	02X	03X
S2A	--	No	No	Yes	No
S2B	No	--	No	Yes	No
S3G	No	No	--	No	Yes
02X	No	No	No	--	No
03X	No	No	No	No	--

**Note:** Models S2B, S3G, and 03X are not supported by S/3.

## ACCESSORIES

For shipment with machine, order the feature number as shown below. See detailed description below for additional information and for ordering by MES for field installation.

Item	Feature No.	P/N	Max Qty
Magnetic Hand Scanner	#9440	4123495	*
Magnetic Slot Reader	#9441	4123500	*

\* A maximum of one magnetic reader or scanner may be ordered.

Magnetic Reader Extension Cable for use with Magnetic Hand Scanner or Magnetic Slot Reader:

Item	Feature No.	P/N	Max Qty
6m (20 ft)	#9106	4832986	**
12m (40 ft)	#9107	4832987	**

\*\* A maximum of one extension cable may be ordered.

Item	Feature No.	P/N
Tilt/rotate accessory	N/A	4422265
Control Unit Switch	MES only	
Battery	N/A	

The following cable assemblies can be used to extend the Magnetic Hand Scanner and Magnetic Slot Reader distances. Limitations: Extension cables cannot be plugged into other extension cables. Prerequisites: #4999.

Item	Feature No.	P/N
6m (20 ft)	#9106	4832986

12m (40 ft) #9107 4832987

If ordering by MES for field installation, one of the following manuals should be ordered. English manual is always supplied. The MSR/MHS customer service manuals, and their form numbers, are:

French GA11-0007  
Spanish GA10-8101  
Japanese NGA24-3663

Both the MHS and the MSR read magnetically encoded information from an alphanumeric character set. The MSR also reads the same 10-character numeric only set as the 3277 Operator Identification Card Reader (#4600) which is not a subset of the alphanumeric character set. For a further description of both character sets, see "IBM 3270 Information Display System Character Set Reference", GA27-2837. Either (not both) the alphanumeric or the 10 numeric only 3277-like character set may be selected for the 3274 at customization time for attached 3278s and 3279s. The 3276 and attached 3278s and 3279s support only the MSR and the 10-character numeric only set as used by the 3277.

Numeric and alphanumeric character capabilities are as follows:

MSR/ MHS	Minimum number of Hex Codes	Maximum number of characters	Density	
	between start and end sentinel chars		Bits per inch	Bits per mm
3277- Like 10-num char set*	7 7	37 118	75 127	3 5
Alpha- meric char set*	7 7 7 7	37 num 18 non-num 118 num 59 non-num 37 num	75 75 127 127 210**	3 3 5 5 8.3

\* 1 Hex code = 1 numeric character  
2 Hex codes = 1 non-numeric character  
\*\* MSR only

Full width encoding is recommended for the MSR and is required for the MHS.

Maximums shown are ALL numeric or ALL non-numeric characters. If a combination of numeric and non-numeric characters is recorded, the total number of hex CODES must not exceed the numeric character maximum. For example, at 127 bpi, a combination of 60 numeric and 20 non-numeric character is permissible.

Limitations: 3277-like 10 character set numerics only magnetic cards coded with Alternate End or Message character (hexadecimal 'C'), cannot be read by the MSR or MHS. The alphanumeric character set and the MHS are only supported on 3278s and 3279s which are attached to 3274s. IBM Host Programming Support is provided for alphanumeric character set non-protected, display data entry. Protected, non-display data entry is supported by IMS and TSO. With this protected, non-display data entry support, all cards and documents which can be read by the 3630 Plant Data Communication System, up to 118 data characters, can be read by the 3270 System.

A variety of magnetic documents, tags and labels which the MSR and MHS can read, may be obtained from NDD, some of which, depending on length, can be encoded by devices such as the 3642 Encoder Printer. Except in the UK, for complete information on the availability of pre-encoded magnetic striped plastic cards, contact an NDD Sales Representative.

**Switch Control Unit:** Permits switching operational control of a 3279 between two different control units. Customer is responsible for

Procurement and installation of this accessory, and also for the replacement of a defective unit. Warranty: The Switch Control Unit is warranted free from defects in workmanship and materials for 90 days. Maintenance: There is no regularly scheduled maintenance recommended by IBM, and IBM Maintenance Agreements are not available. Ordering Instructions: This accessory is ordered by P/N via MES for field installation only. One of the following P/Ns should be ordered when ordering by MES for field installation.

English 4419338  
Canadian French 4419343  
Japanese 4419346  
Brazilian/Portuguese 4419348  
Spanish 4419349

**Lithium Battery (P/N 6042018):** This supply item is a 3.0 Volt non-rechargeable lithium battery which provides power to sustain the convergence parameters in a 3279 when normal power is not present. Field Installation: Yes, by customer. Note: Discharged batteries should be returned to IBM for disposal, return information is printed on the label. Ordering Information: Order by DP Supply Order from Mechanicsburg.

**Keyboard Overlay (P/N 1742762):** A keyboard overlay is available on which customer-defined Programmed Symbols can be annotated. An annotated overlay can be placed over the narrow keytops of Overlay keyboards to associate specific keytops with specific symbols.

88-Keyboard Overlay P/N 1742781

**Keys (P/N 4420756):** The 3279 with Security Keylock is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys only to original purchaser). A letter of authorization, with key identification (on customer metal tag), must accompany each order. Allow two to three weeks for delivery.

**Magnetic Hand Scanner (#9440, P/N 4123495):** The Magnetic Hand Scanner (MHS) attaches by a 1.5m (5 ft) coiled cable to a 3279 that has an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. It can read a stripe in either direction. Field Installation: Yes. Prerequisites: #4999. See Note 1 under #4999.

Ordering Instructions: When ordering via MES, order from Raleigh.

Maintenance: High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking: For 50 scanners, 2 spares; for 100, 3; for 150, 4; for 200, 5.

Warranty: The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time-and-Material basis from CE other than Canada. In Canada,

optional IBM maintenance is available on a time-and-materials basis at the Repair Center. Authorization Form #2110 applies

**Magnetic Slot Reader (#9441, P/N 4123500):** The Magnetic Slot Reader (MSR) attaches by a 1.5m (5 ft) cable to a 3279 that has an appropriate magnetic adapter feature. The slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including job tickets, magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc. The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. Field Installation: Yes. Prerequisites: #4999. See Note 1 under #4999.

Ordering Instructions: For delivery with machine, see above. When ordering via MES, order from Raleigh.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking: For 50 readers, 2 spares; for 100, 3; for 150, 4; for 200, 5 spares.

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a time-and-material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time-and-material basis at the Repair Center. Authorization Form #2110 applies.

A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

Magnetic Slot Reader, P/N 4123500 or feature code #9441

**Magnetic Reader/Scanner Extension Cables:** These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. **Warranty:** MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. **Limitations:** Extension cables cannot be plugged into other extension cables.

6m (20 ft) P/N 4832986  
12m (40 ft) P/N 4832987

#### Magnetic Reader/Scanner Replacement Assemblies:

MHS Sensor Head Assembly 4832721  
MHS Handle and Feedback Assembly 4832701  
MHS Amplifier Card & Cable Assembly 4832727  
MSR Arm and Sensor Head Assembly 4832963  
MSR Base and Feedback Assembly 4832973  
MSR Amplifier Card & Cable Assembly 4832962  
MSR Cover 4832964

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

#### Magnetic Hand Scanner Replacement Assembly Stocking:

Number of MHSS P/N	Sensor Head Assy P/N	Handle & Feedback Assy P/N	Amp Card and Cord Assy P/N
	P/N	P/N	P/N
4123495	4832721	4832701	4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

#### Magnetic Slot Reader Replacement Assembly Stocking:

Number of MSRs P/N	Arm and Sensor Head Assy P/N	Base & Feed- back Assy P/N	Ampli. Card & Cord Assy P/N	Cover P/N
	P/N	P/N	P/N	P/N
4123500	4832963	4832973	4832962	4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

Ordering Instructions: Order from CE Stockrooms. See Instruction Letter ZM77-0038, DPCE letter #27 dated October 19, 1977.

**Warranty:** Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**Display Station Keyboard Accessories:** The following keyboard accessories allow customers to define and change the messages on single position keytops of the 3279 keyboards. These accessories supply keytops only and do not change any characters or functions of the display station. The accessories consist of legendable keytops, blank keytops for customer engraving, a keytop extractor, and an Entry Assist Keytop kit. (Canada only> These accessories may be ordered by P/N via a DP Supply Order from the Raleigh plant.<)

(Canada only> These accessories should be bulk ordered by P/N on a P&SR from the plant of manufacture. Individual customer requirements should be satisfied from local country stock.<)

**Legendable Keytop:** The legendable keytop consists of two parts: A molded key base and a clear plastic cover. The user may define unique keytop messages by writing on a piece of paper, affixing the paper to the keytop base and sliding on the clear plastic cover. The keytop is available in three colors and with top keyboard row contour only. (Example: Clear Key.)

White 5188775  
Charcoal Gray 8627192  
Light Gray 8542831

**Blank Keytop:** The blank keytop is for a customer to engrave with desired nomenclature. The keytop comes in three colors and is available with top keyboard row contour only. (Example: Clear Key.)

White 1853775  
Charcoal Gray 1853567  
Light Gray 1853563

**Keytop Extractor (P/N 9900373):** The keytop extractor is a small tweezer-like device which fits between the keytops. With a firm squeezing grip on a keytop, the keytop can be pulled of its stem. The customers should use the extractor whenever a keytop is to be removed from a keyboard.

**Entry Assist Keytop Kit:** (Non-overlay keyboards only) This kit provides eight sets of five keytops appropriately labelled for use with the Entry Assist capability together with a keytop extractor and

keytop replacement instruction. Not for use on 3178 keyboards or overlay keyboards.

Brazil 4942307  
Canadian Bilingual 4942308  
International, EBCDIC/WT 4942311  
Japanese English 4942315  
Spanish Speaking 4942318  
English UK 4942312  
English US 4742774

**Display Station Tilt/Rotate Accessory (P/N 4422265):** An accessory which fits under the display station and provides a ball and socket type movement to allow the angle of the screen face to be adjusted for comfort of viewing position. The screen angle is normally 20 degrees from the vertical but with this device it can be adjusted between 25 degrees to the vertical and the vertical position. A locking device is provided to maintain the selected position. This accessory also allows the display station to be rotated plus or minus 90 degrees from the central position and this movement is independent of the tilt movement.

For the countries in which it is released, the Tilt Rotate Accessory is an NDD Product.

**Warranty:** The Tilt Rotate accessory is warranted free from defects in workmanship and materials for 90 days.

**Maintenance:** There is no regularly scheduled preventive maintenance recommended by IBM, and IBM Maintenance Agreements are not available.

**Customer Responsibility:** The customer is responsible for mounting the Display Station on this accessory.

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

- Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

- Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

- Assm 2577672 Cable Assembly In-Door
- Bulk 0323921 Coax Wire (Note 1)
- P/N 1836418 Connector Kit (Note 1)
- Assm 1833108 Cable Assembly Out-Door
- Bulk 5252750 Coax Wire (Note 2)
- P/N 1836419 Connector Kit (Note 2)
- P/N 1833104 Station Protector Kit, Carbon (Note 4)
- P/N 2621414 Modification Kit (Note 3)
- P/N 1833106 Station Protector Attachment Kit (Note 5)
- P/N 5252772 Station Protector Element Carbon (Note 6)
- P/N 5252643 Adapter (Note 7)
- P/N 1830818 Station Protection Kit, Gas (Note 4)
- P/N 5252899 Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

Notes:

1. Coax wire and one connector kit (includes two connectors P/N 1836446) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.
3. Customers replacing 2260 display stations may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N 2577672 or two P/N 1833108 cable assemblies together.

SUPPLIES (NONE)

**MACHINES**
**3284 PRINTER MDL 3**
*Models 1 and 2 have been withdrawn from marketing*
**PURPOSE**

Provides hard copy output at a speed of 40 cps.

**MODELS**
**Model 3 003** Attaches to and uses the storage buffer of a 3275 Display Station model 3.

**Prerequisites:** A 3275 mdl 3 with Printer Adapter (#5550).

**HIGHLIGHTS**

The 3284 printer provides hard copy output at a speed of 40 cps, using the EBCDIC character set. Mdl 3 prints the contents of the buffer of the 3275 Display Station at a speed of 40 cps.

The unit has a pinfeed platen which permits the feeding of marginally punched continuous forms paper. 120-, 126-, and 132-position print lines may be specified ... see "Specify". Line spacing is 6 lines/inch. Matrix characters are formed by 7 vertical wires printing dots in up to 4 of 7 possible horizontal positions. Use of the underscore in conjunction with another character will overprint the lowest dot in that character and is not recommended. Refer to GA24-3488 for forms design considerations and limitations. Up to 6-part forms can be printed with a maximum thickness of .018 inches. Forms lengths can be 3 inches to 14 inches in increments of 1/6 inch. Card stock continuous forms are not recommended.

**Notes:**

- (1) For optimum feeding, stacking, and legibility, forms of no more than three parts should be used.
- (2) Katakana character font is formed by 8 vertical wires printing dots in up to 5 of 9 possible horizontal locations.

**Bibliography:** See *KWIC Index*, G320-1621, or specific system bibliography.

**SPECIFY**

- Power (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730 (Japan only)
110V #2805	115V #9901
123.5V #2811	
220V #2813	
235V #2814	

For Japan only: Specify #9890 for locking plug or #9891 for non-locking plug for voltages under 200V.

- Machine Nomenclature [plant installation only]:

English UK #2927	Italian #2932
English US #2750	Japanese #2930
French #2928	Spanish #2931
German #2929	

- Character Generator Language: Select one of the following unless the Katakana Character Generator feature is required. See "Special Features". If dual case character set is required, refer to RPO listing.

Austrian	#2704 - Monocase
Belgian	#2705 - Monocase
Belgian	#2709 - Dual Case
Danish	#2710 - Monocase
Finnish	#2708 - Monocase
French	#2705 - Monocase
French	#2709 - Dual Case
German	#2704 - Monocase
Italian	#2702 - Monocase
Italian	#2702 - Dual Case
Norwegian	#2710 - Monocase
Portuguese	#2712 - Monocase
Spanish Speaking	#2714 - Monocase
UK English	#2703 - Monocase
US English	#2705 - Monocase

- Pinfeed Platen:

#9167 for 120 print positions (12-1/2" hole-to-hole)  
#9162 for 126 print positions (13-1/8" hole-to-hole)  
#9168 for 132 print positions [uses non-standard paper]  
(13-7/8" hole-to-hole)

**Note:** Do not order #9167 or #9168 unless paper is available in your area.

**SPECIAL FEATURES**
**Katakana Character Generator (#2706):** Provides the ability to print the characters described on the Katakana Keyboard. **Prerequisites:** #2707 on 3271, 3272, 3275. **Field Installation:** No.

**TERMS and CONDITIONS**

Plan Offering: Plan B  
Purchase Option: 60 %  
Base Term: 24 months  
Machine Group: A  
Warranty: B  
Per Call: 1  
Term Plan: 24 months

Termination Charge Percent: 25 %  
Termination Charge Months: 5  
(Canada only) Upper Limit Percent:  
5 % +)  
Educational Allowance: Yes  
Non-Field Installable Feature/  
Model Conversions: Yes

**MODEL CONVERSIONS**

Model 3 is field-installable on the 3275.

**ACCESSORIES**

The following item is available on a purchase-only basis. For shipment with machine, order the feature number indicated below.

**Forms Stand (#4450):** Permits placement of continuous forms (out of carton) on stand above floor and provides for stacking after printing.

**SUPPLIES**
**Ribbons:** A black ribbon (P/N 1136970), or equivalent, must be used.

## 3287 PRINTER MODELS 1, 2

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

**PURPOSE**

Provides hard copy output. The 3287 mdl 1 and 2 attach to a 3271 mdl 1, 2, 11 or 12, or a 3272 mdl 1 or 2, or a 3791 Controller, or a 3274 (all mdl), or a 3276 mdl 1, 2, 3, 4, 11, 12, 13 or 14, or an 8775 or 3601, 3602, 3694, or 4701 mdl 1 or 2, the 8101 Storage and Input/Output Unit of the 8100 Information System, or the 3814 Switching Management System mdl A. The 3287 mdl 1 or 2 also attaches directly to the 4341 Processor, to the 4331 or 4361 Processor via Display Print Adapter, or Workstation Adapter to the 3081/3083/3084 Processor through the 3082 Processor Controller, to the 3090 Processor through the 3092 Processor Controller, and to the S/370 mdl 138 or 148 via the Integrated Console Printer Adapter, and to the 9370 via the Workstation Subsystem Controller.

### MODELS 1, 2

**Model 1 001:** 80 cps maximum bidirectional printer

**Model 2 002:** 120 cps maximum bidirectional printer

**Note:** Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

#### Prerequisites:

3287 Att.	Device Adapter on Control Unit
3271/ 3272	#8330 Available port or added #3250
3274	#8331 Type A or B Adapter or #8330(see M3274 pages)
3276	#8331 Available port or added #3255, #3256, #3257
3791	#8330 Available port or #7911 #7912 or added #7912
3138/ 3148	#8330 Integrated Console Printer Adapter
3081/ 3083/ 3084	#8331 Attaches through a 3082 Processor Controller
3090	#8331 Attaches through a 3092 Processor Controller
3601/ 3602/ 3694/ 4701	#8331 Dev Cluster Adpt #3101
3814	#8331 Attaches through 3814 Display/Printer Attchmt #1420
4331/ 4361	#8331 Available port on Display/Printer Adapter

or Workstation Adapter  
on the 4361

4341/ 4381	#8331 Available console position on 4341/4381
8101	#8330 Available port on Display/Printer Attachment #3220 or added #1506
8775 9370	#8331 #5580 #6020 Workstation Subsystem Controller

**Customer Setup (CSU):** The 3287 is designated as Customer Setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

#### HIGHLIGHTS

The 3287 consists of control functions, printer and indicator lights in one integrally designed desk-top unit. Special features are available which permit tailoring of the printer to the user's requirements.

Where the 3287 replaces a 3284 or 3286, the Variable-Width Forms Tractor (special feature) is used in lieu of the Pinfeed Platen or Forms Tractor RPQ WD4031. In addition Friction-Feed Paper Handling is available as a special feature.

**Control Functions:** Provides the control for all online operations. This unit requires the 3271/3272 Attachment (#8330) for receiving data from a 3271/3272, or a 3790 Communications System, or a 3274 through Terminal Adapter B, or a S/370 mdl 138/148 (Integrated Console Printer Adapter), or the 3274/3276 Attachment (#8331) for receiving data from a 3274 through Terminal Adapter Type A, or through the 8101 Storage Input/Output Unit of the 8100 Information System, or the 3814 Switching Management System mdl A, or a 3276, or an 8775 or a 4361, 4331 or 4361 Processor Display/Printer Adapter or Workstation Adapter on the 4361 or a 4341 Processor, or a 3082 Processor Controller, or a 3601 or a 3602 Controller, or the 3694 Document Processor of the 3600 Finance Communication System, or a 4701 mdl 1 or 2 Controller of the 4700 Finance Communication System.

**Printer:** Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. The printer dot matrix is 4 of 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 6 and 8 lines to the inch. Up to 132 characters can be printed in a line. Up to 6-part forms with total thickness of 0.457mm (0.018 inches) may be used. For any multi-part or pre-printed continuous forms the Variable-Width Forms Tractor (#8700) is recommended. 5- and 6-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality.

The Friction-Feed Paper Handling (#4110) is recommended for use with non-preprinted single part roll or fanfold paper, with a minimum width of 203mm (8 inches), when the Variable-Width Forms Tractor (#8700) is not used. Maximum overall forms width is 378mm (14-7/8 inches); card stock forms are not recommended. (See GA24-3488 for forms specifications and limitations).

Audible Alarm, Mono/Dual case, Single/Double line spacing, 6 or 8 Lines Per Inch, Page Length Selector Control Switches, and Maximum Print Position are standard functions. Audible Alarm (activated under program control) and Dual Case are not supported by S/370 mdl 138/148 as a Console Printer, or when attached to any 4300 processor. Mono/Dual switch is inoperative when the 3287 is operating in SCS (SNA Character String) data stream mode or when copying from a display or when operating in APL or PS mode. Mono/Dual switch is not supported for Katakana. Refer to

## MACHINES

GA27-2837, "IBM 3270 Information Display System Character Set Reference".

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 3287.
3. Physical setup, connection of cables, switch settings and checkout.
4. Contact CE to make cable connections of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
5. Notify IBM of intent to relocate and follow IBM instructions for relocation.
6. Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
7. Disconnecting, packing and removing to the customer shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
8. Providing a desk or table top to support the 3287.

**Forms Handling:** Variable-Width Forms Tractor (#8700) or Friction Feed Paper Handling (#4110) must be ordered for each 3287 mdl 1 or 2. VWFT is recommended for the System Console Printer.

**Publications:** See KWIC Index, GA20-1621, or specific system bibliography.

## SPECIFY

Specify Features (For details, see "Specify Descriptions")

### 3287 Attachments:

- A = 3271/3272 Control Unit
- B = 3274 Control Unit
- C = 3276 Control Unit Display Station or 8775 display station
- D = 3791 Controller
- E = S/370 mdl 138/148
- F = 8100 System (8101 Attach)
- G = 4331,4341, 4361 Processor
- H = 3600 System (3601/3602/3694 Attach or 4700 System (4701 attach))
- I = 3081/3083/3084 Processor
- J = 3814 Switching Management System mdl A

No. A B C D E F G H I J

Power:

See Specify Descriptions x x x x x x x x x x

Plugs:

See Specify Descriptions x x x x x x x x x x

Power Cord:

2.8m Default x x x x x x x x x x  
(9 ft)

1.8m	#9511	x x x x x x x x x x
(6 ft)		
3.7m	#9512	x x x x x x x x x x
(12 ft)		
4.5m	#9513	x x x x x x x x x x
(15 ft)		

Cables:

See Specify Descriptions x x x x x x x x x x

Machine Nomenclature:

See Specify Descriptions x x x x x x x x x x

Language (Note 1):

See Specify Descriptions x x x x x x x x x x

Variable-Width Forms Tractor:

Paper Handling #9185 x x x x x x x x x x

SCS Support:

#9660 x x x x x x

SCS Support for SFAP:

#9661 x

X-Print Error Indication:

#9488 x x x x x x x x x x

Character Print Operation (Note 2):

480 Chars	#9520	x x x x
960 Chars	#9521	x x
1920 Chars	#9522	x x x x x x x x x x
2560 Chars	#9523	x x
3440 Chars	#9524	x x
3564 Chars:		
(Note 3)	#9525	x

Blower

#9030 x x x x x x x x x x

Notes:

1. Do not specify if Data Analysis-APL Feature (#1066) is selected for attachment to the 3271 or 3272.
2. For Terminal Adapter Type B on the 3274, select from #9520 and #9522 for Character Print Operations. Specify features #9521, #9523, #9524, #9525 and #9660 cannot be selected for Terminal Adapter Type B. For Terminal Adapter Type A, #9520 is not available. For the attachment to a 3274 mdl 52C, specify features #9520, #9523 and #9524 cannot be selected.
3. Not valid when the 3287 is attached to a 3274 using Configuration Support A #9110.

### Specify Descriptions:

- (Canada only) Administrative Order Control: #9010 is required as administrative prerequisite for specific features, used to differentiate manufacturing level of machine.<)
- Plugs: The 3-digit country code on the DPMO is used to select a power plug which matches the most commonly used power supply in that country. If an exception to the above is required, a country RPQ may be initiated. For Japan and Canada: Specify #9890. (Canada only) Limitations: Not available on machines with serial number N0000 and later. Prerequisites: #9010<) for locking plug or #9891 for nonlock-

ing plug. For details concerning power plugs, refer to "IBM 3287 Printer - Planning and Setup Guide", GA18-2018. Note: If a power supply, not the most common, is specified and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

Canada will use the same power cords and plugs as used in the U.S.

- Power (AC, 1-phase): Specify #2998 for all countries and then select one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800
	(includes 115V)
220V #2813	127V #2823
230V #2821	
240V #2801	Canada must specify #2800

- Power Cord: If standard 2.8m (9 ft) power cord is not desired, specify: #9511 for 1.8m (6 ft) power cord, #9512 for 3.7m (12 ft) power cord or #9513 for 4.5m (15 ft) power cord.
- (Canada only) Limitations: Only standard 2.8m power cord is available on machines with serial numbers N0000 and later. Prerequisites: #9010 for power cords other than standard 2.8m. Specify: #9010 as a prerequisite with any of the following: #1066, #1120, #3610, #5781, #5782, #8330, #9030, #9511, #9512, #9513, #9520, 9661, or #9890.<)
- Cables: See "Accessories" for cable ordering instructions. See "Installation Manual - Physical Planning", GA27-2787, for cable details. When attached as a console printer, refer to "Installation Manual - Physical Planning", GA22-7004, for S/370 mdl 138/148 and GA24-3667 for 4300 processors, for cable details.
- Machine Nomenclature: Available at time of manufacture only.
 

Brazilian	#2933	French	#2928
Canadian Fr	#2935	Japanese	#2930
English UK	#2927	Span Speak	#2931
English US	#2924		
- Language: Specify one of the following (see Note 1):
 

Brazilian	#2775
Canadian French	#2777
EBCDIC	#2751
English UK	#2758
English US	#2756 (Note 2)
International	#2750
Japanese English	#2755
Katakana	#2773 (Note 1, 2)
Spanish Speaking	#2769

Notes:

- 127-Character, plus space and null, is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be compatible on existing 3270 applications for customers using the NL and EM codes. Customers who do not use NL and EM codes can operate in 3270 data stream compatible mode on the 3274 and 3276. When #2773 is specified, the Page Length Control Selector Switch is inoperative.

When Katakana Language #2773 is specified for use on a 308X, the mono/dual mode setting must be in mono mode.

For a 3274 mdl 52C only, specify #2773 or #2756 for Language.

The Language specified must be the same as the transmission code/character set used on the control unit/CPU to which it is attached.

- Only options for 308X.

- Variable-Width Forms Tractor - Paper Handling (#9185): Specify if (#8700) is ordered and there is a requirement to handle forms with overall width from 76.2 to 203.2mm (3 to 8 inches). Prerequisites: #8700.
- SCS Support (#9660): (Required in an SNA environment/LU Type 1 This is a prerequisite for #8331, although inoperative in a non-LU Type 1 Environment.) Provides the capability to receive SCS (SNA Character String) data stream from the host via a 3274 or a 3276 or a 3601/3602 Finance Communication System Controller or 3694 Document Processing System, or 4701 Finance Communication System Controller, or the 3814 Switching Management System mdl A. This feature allows the 3287 to perform such functions as:
  - Vertical forms skipping to a header or to a vertical tab position
  - Horizontal skipping to a horizontal tab stop position

Page length controls, vertical and horizontal tab positions are host-loaded through the 3274, 3276, 3601/3602/3694, or 4701 via application programming. Included in #9660 are Cancel and Program Attention 1/Program Attention 2 (PA1/PA2) switches. The cancel switch allows operator termination of the current print operation. The PA1/PA2 switch allows an operator to request a specific action from the user written program in the host. Operator settings for page length control, 6 or 8 lines per inch, and Maximum Print Position are set by the host program when the 3287 has #8331 and #9660 and only when user is operating in SCS mode. SCS Mode always operates in Dual Case. Limitations: Cannot be installed with #8330. Maximum: One. Field Installation: Yes. Note: If the 3287 Page Length Control Selector Switches are required for field installation on a machine with serial number below 17000, order no-charge RPQ S30221.

- SCS Support for Structured Field and Attribute Processing (#9661): This is a prerequisite for #5781, although inoperative in a non-LU Type 1 environment. Required for SCS support of:
  - Extended Highlighting (underscore)
  - Programmed Symbols (PS-2 (#5781) , PS-4 (#5782))
  - Decompression of PS Load Data
  - Read Partition (Query)
- (Canada only) Limitations: Not available on machines with serial number N0000 and later.<) Maximum: One. Field Installation: Yes. Prerequisites: #3610, #5781.(Canada only> #9010, <) #9660.
- X-Print Error Indication (#9488): To indicate an error, an X is printed on the print line immediately below the last line normally printed. Limitations: Inactive when the 3287 is in SCS mode of operation.
- Character Print Operation:

For 3271/3272 Attachment #8330, specify one of the following:

- #9520 (480-character print operation) for use with a 3271 mdl 1 or 11, or a 3272 mdl 1 or a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, or a 3791 Controller or to the 8101 of the 8100 System when attached via #8330. (Canada only) Limitations: Not available on machines with serial number N0000 and later. Prerequisites: #9010.<)
- #9522 (1,920-character print operation) for use with a 3271 mdl 2 or 12, a 3272 mdl 2, or a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, or a 3791 Controller, or to the 8101 of the 8100 System when attached via #8330, or a S/370 mdl 138/148 Integrated Console Printer Adapter.

## MACHINES

(Canada only) Limitations: Not available on machines with serial number N0000 and later. Prerequisites: #9010.<)

For 3274/3276 Attachment #8331, specify one of the following:

- #9521 (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.
- #9522 (1,920-character print operation) for use with a program which requires a printer buffer size of 1,920 bytes while using Erase/Write Alternate Command. Required when attached to a 308X processor, 3814 Switching Management System mdl A or 4300 processor as a console printer.
- #9523 (2,560-character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command. Prerequisites: #3880.
- #9524 (3,440-character print operation) for use with a program which requires a printer buffer size of 3,440 bytes while using Erase/Write Alternate Command. Prerequisites: #3880.
- #9525 (3,564-character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate command. Limitations: This specify code is not valid when the 3287 is attached to a 3274 using Configuration Support A #9110. Prerequisites: #3880. Note: To provide compatibility with current application programs on the 3270 Information Display System, the customer can use an Erase/Write command for #9521 to provide 480-character print operation and Specify #9522, #9523, #9524 and #9525 to provide 1,920-character print operation. Copy operation from larger screen display to smaller printer buffer is not acceptable.

### 3287 PRINTER ATTACHMENT TABLE

#### 3287 Character Print Operation

3276	480/	1,920/	1,920/	1,920/
mdl	960	1,920	2,560	3,440
1	Yes	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	Yes	No	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

1	Yes	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	Yes	No	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

Note: 3276 mdls 1, 2 and 3 with SDLC/BSC Switch feature installed and operating in SDLC mode will support all 3287 Character Print Operations, except 3,564-character print operation #9525. Also see Copy restrictions in Note above.

- Blower (#9030): Must be specified for 3287 mdl 1 or 2 to be used in an environment above 32.3 degrees C (90 degrees F) ambient temperature (specification limits up to 40.5 degrees C (104 degrees F)). Field Installation: Yes. (Canada only) Limitations: Not available/required on machines with serial number N0000 and later. Prerequisites: #9010.<)

### SPECIAL FEATURES

Summary: (For details see "Special Feature Descriptions")

### 3287 Printer

### 3287 Attachments

- A = 3271/3272 Control Unit
- B = 3274 Control Unit
- C = 3276 Control Unit Display Station or 8775 display station
- D = 3791 Controller
- E = S/370 mdl 138/148
- F = 8100 System (8101 Attach)
- G = 4331, 4341 Processor
- H = 3600 System (3601/3602/3694 Attach or 4700 System (4701 attach))
- I = 3081/3083/3084 Processor
- J = 3814 Switching Management System mdl A

No. A B C D E F G H I J

#### 3271/3272 Attachment:

(Note 2) #8330 x x x x x

#### 3274/3276 Attachment:

#8331 x x x x x

#### Friction-Feed Paper Handling:

#4110 x x x x x x

#### Variable-Width Forms Tractor:

#8700 x x x x x x x x x

#### Data Analysis-APL Feature:

#1066 x

#### Extended Print Buffer:

(Note 2) #3880 x x

#### Extended Character Set Adapter:

#3610 x x

#### APL/Text:

(Note 1) #1120 x x

#### PS-2:

#5781 x

#### PS-4:

#5782 x

#### Notes:

1. Cannot be installed on a 3287 which is attached to an 8775.
2. Cannot be installed on a 3287 which is attached to a 3274 mdl 52C.

### Special Feature Descriptions

**Data Analysis-APL Feature (#1066):** Provides Dual Case US EBCDIC, the APL set and support of TN characters as defined in the Type Catalog, S/370 Printers, under "TN Text Printing". (Canada only) Limitations: Not available on machines with serial number N0000 and later.<) Cannot be installed with Language Specify Feature, an #8330 to a 3274, or #8331. When #1066 is installed, the Page Length Control Selector Switches are inoperative. Maximum: One. Field Installation: Yes. Prerequisites: (Canada only) #9010; <)#9522; #1066 on 3271 mdl 2 or 12, or 3272 mdl 2. Customer Setup: No.

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**APL/TEXT (#1120):** Provides the capability for printing the 222-character APL/Text character set including the 94-character EBCDIC set. Limitations: Cannot be installed with #8330, or on the 3287 which is to attach to a 3276 without #1067 or 3274 mdl 1B or 21B, or to a 3274 customized without the APL/Text control functions or when attached to an 8775 or on a 3814 Switching Management System. Not supported when attached to any 308X processor or 4300 processor as a console printer. (Canada only> Limitations: Not available on machines with serial number N0000 and later.<) Maximum: One. Field Installation: Yes. Prerequisites: #3610(Canada only>, #9010, #9082<) Customer Setup: No.

**Extended Character Set Adapter (#3610):** Provides the additional control and buffering necessary for the character and field attributes required for #1120 or #5781, #5782. Provides extended highlighting (underscore) when co-resident with PS-2, PS-4. Limitations: Cannot be installed with #8330 or 3274 mdl 1B or 21B or when attached to an 8775. (Canada only> Limitations: Not available on machines with serial number N0000 and later.<) Maximum: One. Field Installation: Yes. (Canada only> Prerequisites: #9010.<) Prerequisites: #1120 or #5781. Customer Setup: No.

**Extended Print Buffer (#3880):** Provides additional buffer storage which allows 2,560, 3,440 or 3,564-character print operation on the 3287. Limitations: Cannot be installed with #8330, nor with a 3287 which is attached to a 3274 mdl 52C, or when attached to a 3814. Not supported when attached to any 308X processor or 4300 processor as a console printer. Maximum: One. Field Installation: Yes. Customer Setup: No.

**Friction-Feed Paper Handling (#4110):** For friction feeding of single part non-preprinted continuous and fanfold paper with a minimum width of 203mm (8 inches). Included in this feature is a paper tear bar for tearing continuous forms approximately 51mm (2 inches) above the print line. Feature #4110 is used interchangeable with the Variable-Width Forms Tractor and is attached and removed by the customer. Maximum: One. Field Installation: Yes. Customer Setup: Yes. Note: If forms skipping is required, it is recommended that #8700 be used.

**Programmed Symbols-2 (PS-2) (#5781):** Provides the storage and accessing of two 190-symbol sets whose shapes and codes are customer-definable. Maximum: One. Limitations: Can only be used with 3274 Category A terminal port with PS Control and Structured Field and Attribute Processing (SFAP) options of Configuration Support C or D. (Canada only> Not available on machines with serial number N0000 and later.<) Maximum: One. Field Installation: Yes. Prerequisites: #3610, #3880, (Canada only> #9010, <) #9661. Customer Setup: No.

**Programmed Symbols-4 (PS-4) (#5782):** Provides the storage and accessing of four additional 190-symbol sets whose shapes and codes are customer-definable. (Canada only> Limitations: Not available on machines with serial number N0000 and later.<) Maximum: One. Field Installation: Yes. Prerequisites: (Canada only> #9010, <) #5781. Customer Setup: No.

**3271/3272 Attachment (#8330):** Provides one interface for attachment of a 3287 mdl 1, 2 to a 3271 mdl 1, 2, 11 or 12, a 3272 mdl 1 or 2, or a 3274 mdl 1A, 1B, 1C, 1D, 21B, 21C/BSC, 21D, 31A, 31C, 31D, or 51C, or a 3791 Controller, or an 8101 Storage and Input/Output Unit, or a 3287 mdl 1, 2 to a S/370 mdl 138 or 148 Integrated Console Printer Adapter. Provides the buffer storage required for print operation. Limitations: Cannot be installed with #8331 or with #1066 to a 3274. 127-character plus space and null Katakana Enhancement is not supported. (Canada only> Not available on machines with serial number N0000 and later.<) Maximum: One. Field Installation: Yes. Prerequisites: (Canada only> #9010.<) For 3271/3272 -- available port or added #3250 on a 3271 mdl 1, 2, 11 or 12, or 3272 mdl 1 or 2 -- see M3271 or 3272 pages. For 3274 -- An available Type B port -- see M3274 pages. For 3791 Controller -- Device Attachment Type II (#7911/#7912) -- see M3791 pages. For 8101 Storage and Input/Output Unit -- Display and Printer Adapter (#3220) or Display and Printer add'l (#1506) -- see M8101 pages. For S/370 mdl 138 or 148 -- An Integrated Console Printer Adapter -- see M3138 or 3148 pages. Customer Setup: No.

**3274/3276 Attachment (#8331):** Provides one interface for attachment of a 3287 to a 3274 (all mdls), or to a 3276 mdl 1, 2, 3, 4, 11, 12, 13 or 14, or to an 8775 or to a 3601/3602 Finance Communication Controller, 3694 Document Processing System, 4700 Finance Communication Controller, or to the 3082 Processor Controller, or the 3814 Switching Management System mdl A, or to any 4300 processor. Provides buffer storage required for print operation. Included in this feature is Buffer Reprint support. Limitations: Cannot be installed with #8330 or #1066. Maximum: One. Field Installation: Yes. Prerequisites: (1) #9660, (2) An available port or added #3255, #3256, #3257 on a 3276, or an available Type A port on a 3274, or an available port of a 3082 Processor Controller, or an available port on the 4331 or 4361 Processor Display/Printer Adapter, or Workstation Adapter on the 4362 or an available console position on a 4341 or 4381 Processor, or a Device Cluster Adapter (#3101) on a 3601/3602/3694/4701 or printer attachment (#5580) on an 8775, or Workstation Subsystem Controller on the 9370 Processor. Customer Setup: No.

**Variable-Width Forms Tractor (#8700):** A forms feeding device for continuous margin punched forms. Overall forms width from 76.2 to 381.0mm (3 to 15 inches) can be fed. Maximum: One. Field Installation: Yes. Prerequisites: #9185 where there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). Customer Setup: Yes. Note: If forms skipping is required, it is recommended that the Variable-Width Forms Tractor (#8700) be used.

## MODEL CONVERSIONS

Model 1 to 2 is field installable.

## ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order number indicated below.

**Forms Stand (#4450, P/N 2526750):** Available on a purchase-only basis. For shipment with machine, order #4450. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. Customer Setup: Yes. For field installation:

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted pair cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and other information, refer to the Systems Supplies operation within your country.

**Coaxial cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

- Assm 2577672 Cable Assembly In-Door
- Bulk 0323921 Coax Wire (Note 1)
- P/N 1836418 Connector Kit (Note 1)
- Assm 1833108 Cable Assembly Out-Door
- Bulk 5252750 Coax Wire (Note 2)
- P/N 1836419 Connector Kit (Note 2)
- P/N 1833104 Station Protector Kit, Carbon (Note 4)
- P/N 2621414 Modification Kit (Note 3)
- P/N 1833106 Station Protector Attachment Kit (Note 5)
- P/N 5252772 Station Protector Element Carbon (Note 6)
- P/N 5252643 Adapter (Note 7)
- P/N 1830818 Station Protection Kit, Gas (Note 4) P/N 5252899 Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

## MACHINES

### Notes:

1. Coax wire and one connector kit (includes two connectors P/N 1836446) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.

5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N 2577672 or two P/N 1833108 cable assemblies.

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136653 or equivalent, is required. Also available is a black ribbon cartridge capability; order RPQ 8Q0199. The replacement ribbon cartridge P/Ns are 7034535 and 7032757.

## 3287 PRINTER MODELS 1C, 2C

### PURPOSE

Provides hard copy output in black or color by using replaceable ribbon cartridges when attached to the 3274, 3276, 4361 Display Printer Adapter or Workstation Adapter and the 8775. Also attaches directly to all models of the 4300 processor, and the 9370 Workstation Subsystem Controller.

### MODELS 1C, 2C

**Model 1C C01:** 80 cps maximum bidirectional printing for a single color on a line

**Model 2C C02:** 120 cps maximum bidirectional printing for a single color on a line

**Note:** Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

Compared to black or monochrome printing, throughput will be reduced when printing in multi-color as a function of the number of color changes on the page due to a separate pass of the print head for each color on a line. In addition, when printing in other than the standard character format (4 of 7 horizontal x 8 vertical dots) and using the Programmed Symbols (PS) special feature (#5781, #5782, #5783), the machines will print at reduced speeds. Under these conditions, mdl's 2 and 2C will print at the reduced speed of the mdl's 1 and 1C. Dense printing when using the PS feature will also lessen printer throughput. The printer prints in one direction only, right to left, when an all black print line exceeds 120 print positions.

### Prerequisites:

- 3274: Available Category A terminal port.
- 3276: Available port or added #3255, #3256, #3257.
- 4331/4361: Available port on the Display/ Printer Adapter or Workstation Adapter on the 4361
- 4341: Available console position on 4341
- 4381: Available console position on 4381
- 8775: Printer Attachment Feature
- 9370: Workstation Subsystem Controller

**Customer Setup (CSU):** The 3287 is designated as Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

The 3287 consists of control functions, printer and indicator lights in one integrally designed desk-top unit. Special features are available which permit tailoring of the printer to the user's requirements.

**Control Functions:** Provides the control for all online operations. This unit requires receiving data from a 3274 through a Category A terminal port or a 3276, 4361 Display Printer Adapter or Workstation Adapter or an 8775.

**Printer:** Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. The standard printer dot matrix is 4 of 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 6 and 8 lines to the inch. With the replaceable black ribbon cartridge, up to 132 print positions can be printed in black on a

line. Using the replaceable multi-color ribbon cartridge, up to 120 print positions can be printed in the colors black, blue, green or red with 121 - 132 print positions printed in black or the whole line printed in black. With the multi-color ribbon, the machine can print in base color. Base color refers to a given color being printed at the field level as a function of the protect, intensify bit positions in the 3270 Data Stream attribute byte. Specifically, the display to printer color mapping is as follows:

3270 Attribute Byte	Color Displ'd	Color Printed
Protected and Intensified	White	Black or Green
Unprotected and Intensified	Red	Red
Protected but not Intensified	Blue	Blue
Neither Protected nor Intensified	Green	Green or Black

The printing of black or green as shown in the table depends upon the Base Color - Black (#9135) or Green (#9136) - specify feature selected.

Extended color printing is the term used for supporting color at the character level in addition to the field level. For any character or field, this additional facility permits the user to select a given color (black, blue, green, red) for printing. The hardware required to support this capability is the Extended Character Set Adapter (#3610) on the printer. Not supported on the 4341 Mdl Group 1, 4341 Mdl Group 2, or on a 8775. The display to printer color mapping for extended color is:

Color Displayed	Color Printed
White	Black
Red	Red
Blue	Blue
Green	Green
Turquoise	Black
Pink	Black
Yellow	Black

Up to 6-part forms with total thickness of 0.457mm (0.018 inches) may be used. For any multi-part or pre-printed continuous forms, the Variable-Width Forms Tractor (#8700) is recommended. 5- and 6-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality.

The Friction-Feed Paper Handling (#4110) is recommended for use with non-preprinted single part roll or fanfold paper, with a minimum width of 203mm (8 inches), when the Variable-Width Forms Tractor (#8700) is not used. Maximum overall forms width is 378mm (14-7/8 inches); card stock forms are not recommended. (See GA24-3488 for form specifications and limitations).

Audible Alarm, Mono/Dual Case, Single/Double line spacing, 6 or 8 Lines Per Inch and Maximum Print Position are standard functions. Mono/Dual switch is inoperative when the 3287 is operating in SCS (SNA Character String) data stream mode or when copying from a display or when operating in APL or PS mode. Mono/Dual switch is not supported for Katakana.

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 3287.
3. Physical setup, connection of cables, switch settings and checkout.
4. Contact CE to make cable connections of IBM CSU units to IBM non-CSU units where customer access areas are not provided.
5. Notify IBM of intent to relocate and follow IBM instructions for relocation.
6. Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
7. Disconnecting, packing and removing to the customer shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
8. Providing a desk or table top to support the 3287.

**Forms Handling:** Variable-Width Forms Tractor (#8700) or Friction-Feed Paper Handling (#4110) must be ordered for each 3287 mdl 1C or 2C. VWFT is recommended for the System Console Printer.

**Publications:** See "KWIC Index", GA20-1621, or specific system bibliography.

## Basic Configuration

### SPECIFY

- **Power (AC, 1-phase):** Specify #2998 for all countries and then select one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800
	(includes 115V)
220V #2813	127V #2823
230V #2821	
240V #2801	Canada must specify #2800

- **Plugs:** The 3-digit country code on the DPMO is used to select a power plug which matches the most commonly used power supply in that country. If an exception to the above is required, a country RPQ may be initiated. For Japan and Canada: Specify #9890 for locking plug or #9891 for nonlocking plug. For details concerning power plugs refer to "IBM 3287 Printer - Planning and Setup Guide", GA18-2018.

**Note:** If a power supply, not the most common, is specified and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

Canada will use the same power cords and plugs as used in the U.S.

- **Power Cord:** If standard 2.8m (9 ft) power cord is not desired, specify: #9511 for 1.8m (6 ft) power cord, #9512 for 3.7m (12 ft) power cord or #9513 for 4.5m (15 ft) power cord.
- **Cables:** See "Accessories" for 3287 mdls 1C and 2C cable ordering instructions. See "Installation Manual - Physical Planning", GA27-2787 or GA24-3667, for cable details.
- **Machine Nomenclature:** Available at time of manufacture only.

Brazilian	#2933	French	#2928
Canadian		Japanese	#2930
French	#2935	Spanish	
English UK	#2927	Speaking	#2931
English US	#2924		

- **Language:** Specify one of the following: (see Note 1)

Brazilian	#2775
Canadian French	#2777
EBCDIC	#2751
English UK	#2758
English US	#2756 (Note 3)
International	#2750
Japanese English	#2755
Katakana	#2773 (Note 2)
Spanish Speaking	#2769

### Notes:

1. The Language specified must be the same as the transmission code/character set used on the control unit/CPU to which it is attached.
2. 127-Character, plus space and null, is an enhancement of previously announced 3270 Japanese Katakana. This enhancement may not be compatible on existing 3270 applications for customers using the NL and EM codes. Customers who do not use NL and EM codes can operate in 3270 data stream compatible mode on the 3274 and 3276. When Katakana Language #2773 is specified, the Page Length Control Selector Switch is inoperative. For a 3274 mdl 52C only, specify #2773 or #2756 for Language. The Language specified must be the same as the transmission code/character set used on the control unit/CPU to which it is attached.
3. Only option for the 3081.

- **Variable-Width Forms Tractor - Paper Handling (#9185):** Specify if #8700 is ordered and there is a requirement to handle forms with an overall width from 76.2mm to 203.2mm (3 to 8 inches). Prerequisites: #8700.

- **SCS Support (#9660):** SCS Support #9660 must be ordered for all mdl 1Cs and 2Cs: (Required in an SNA environment/LU Type 1, inoperative in a non-LU Type 1 Environment.) Provides the capability to receive SCS (SNA Character String) data stream from the host via a 3274 or a 3276. This feature allows the 3287 to perform such functions as:

- Vertical forms skipping to a header or to a vertical tab position
- Horizontal skipping to a horizontal tab stop position

Page length controls, vertical and horizontal tab positions are host-loaded through the 3274 or 3276 via application programming. Included in #9660 are Cancel and Program Attention 1/Program Attention 2 (PA1/PA2) switches. The cancel switch allows operator termination of the current print operation. The PA1/PA2 switch allows an operator to request a specific action from the user-written program in the host. Operator settings for page length control, 6 or 8 lines per inch, and Maximum Print Position are set by the host program when the 3287 has #9660 and only when user is operating in SCS mode. SCS Mode always operates in Dual Case. Maximum: One. Field Installation: Yes. Limitation: Not supported on a 4300 processor.

- **SCS Support for Structured Field and Attribute Processing (#9661):** This is a prerequisite for #5781, or #5783, although inoperative in a non-LU Type 1 Environment. Required for SCS support of:

- Extended Color
- Extended Highlighting (underscore)
- Programmed Symbols (PS-2 (#5781), PS-4 (#5782), PS-4A (#5783))
- Decompression of PS Load Data
- Read Partition (Query)

Maximum: One. Field Installation: Yes. Prerequisites: #3610, #9660.

- X-Print Error Indication (#9488): To indicate an error an X is printed on the print line immediately below the last line normally printed. Limitations: Inactive when the 3287 is in SCS mode of operation.
- Character Print Operation: Specify one of the following:
  - #9521: (960-character print operation) for use with a program which requires a printer buffer size of 960 bytes while using Erase/Write Alternate Command.
  - #9522: (1,920-character print operation) for use with a program which requires a printer buffer size of 1,920 bytes while using Erase/Write Alternate Command. Required when attached to a 4300 processor as a console printer.
  - #9523: (2,560-character print operation) for use with a program which requires a printer buffer size of 2,560 bytes while using Erase/Write Alternate Command. Prerequisites: #3880.
  - #9524: (3,440-character print operation) for use with a program which requires a printer buffer size of 3,440 bytes while using Erase/Write Alternate Command. Prerequisites: #3880.
  - #9525: (3,564-character print operation) for use with a program which requires a print buffer size of 3,564 bytes while using Erase/Write Alternate Command. Prerequisites: #3880. Limitation: This specify code is not valid when the 3287 is attached to a 3274 using Configuration Support A #9110.

**Note:** To provide compatibility with current application programs on the 3270 Information Display System, the customer can use an Erase/Write command for #9521 to provide 480-character print operation and #9522, #9523, #9524 and #9525 to provide 1,920-character print operation. Copy operation from larger screen display to smaller printer buffer is not acceptable.

## 3287 PRINTER ATTACHMENT TABLE

### 3287 Character Print Operation

3276 480/ 1,920/ 1,920/ 1,920/  
Mdl 960 1,920 2,560 3,440

1	Yes	No	No	No
11	Yes	Yes	Yes	Yes
2	Yes	Yes	No	No
12	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	No
13	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	Yes
14	Yes	Yes	Yes	Yes

**Note:** 3276 mdls 1, 2 and 3 with SDLC/BSC Switch feature installed and operating in SDLC mode will support all 3287 Character Print Operations, except 3,564 character print operation #9525. (See also Copy restrictions in Note above.)

- Blower (#9030): Must be specified for 3287 mdl 1C or 2C to be used in an environment above 32.3C (90F) ambient temperature (specification limits up to 40.5C (104F). Field Installation: Yes.
- Base Color - Black #9135: Specified to print in black when the 3279 Display displays in green or the equivalent 3270 attribute byte code is received. The printer will print in green when the 3279s in white or the equivalent 3270 attribute byte code is received. Limitations: Cannot be installed with Base Color - Green (#9136). Applies only when printing in base color. Base color defined in the "Highlights" section.

- Base Color - Green #9136: Specified to print in green when the 3279s in green or the equivalent 3270 attribute byte code is received. The printer will print in black when the 3279 displays in white or the equivalent 3270 attribute byte code is received. Limitations: Cannot be installed with Base Color - Black (#9135). Applies only when printing in base color. Base color defined in the "Highlights" section.

## SPECIAL FEATURES

**APL/TEXT (#1120):** Provides the capability for printing the 222-character APL/Text character set including the 94-character EBCDIC set. Limitations: Cannot be installed on the 3287 which is to attach to a 3276 without APL/Text Control Feature (#1067) or 3274 mdl 1B, or mdl 21B, or mdl 52C, or to a 3274 customized without the APL/Text control function or a 8775. Maximum: One. Field Installation: Yes. Prerequisites: #3610. Customer Setup: No.

**Extended Character Set Adapter (#3610):** Provides the additional control and buffering necessary for the character and field attributes required for extended color (user-selected color for a given character or field), extended highlighting (underscore), #1120 and #5781, #5782 or #5783 feature. Limitations: Cannot be installed on the 3287 which is to attach to a 3274 mdl 1B, or 21B, or to a 8775. Not supported when attached to any 4300 processor as a console printer. Maximum: One. Field Installation: Yes. Customer Setup: No.

**Extended Print Buffer (#3880):** Provides additional buffer storage which allows 2,560, 3,440 or 3,564-character print operation on the 3287. Limitations: Not supported when attached to any 4300 processor as a console printer. Maximum: One. Field Installation: Yes. Customer Setup: No.

**Friction-Feed Paper Handling (#4110):** For friction feeding of single part non-preprinted continuous and fanfold paper with a minimum width of 203mm (8 inches). Included in this feature is a paper tear bar for tearing continuous forms approximately 64mm (2-1/2 inches) above the print line. Feature #4110 is used interchangeable with #8700 and is attached and removed by the customer. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Note:** If forms skipping is required, it is recommended that #8700 be used.

**Programmed Symbols-2 (PS-2) (#5781):** Provides the storage and accessing of two 190-symbol sets whose shapes and codes are customer-definable. Allows printing within a character location in a selected color (black, blue, green or red). Limitations: Can only be used with 3274 Category A terminal port with PS Control and Structured Field and Attribute Processing (SFAP) option of Configuration Support C or D. Cannot be installed with #5783. Maximum: One. Field Installation: Yes. Customer Setup: No. Prerequisites: #3610, #3880, and #9661.

**Programmed Symbols-4 (PS-4) (#5782):** Provides the storage and accessing of four additional 190-symbol sets whose shapes and codes are customer-definable. Allows printing within a character location in a selected color (black, blue, green or red). Limitations: Cannot be installed with #5783. Maximum: One. Field Installation: Yes. Prerequisites: #5781. Customer Setup: No.

**Programmed Symbols-4A (PS-4A) (#5783):** Provides the storage and accessing of four 190-symbol sets whose shapes and codes are customer-definable. Three of the symbol sets allow printing within a character location in a selected color (black, blue, green or red) and the remaining set allows printing up to four colors (black, blue, green and red) within a given character location. Recommended for presentation graphics, reference 3270 Information Display System Color and Programmed Symbols, GA33-3056. Limitations: Can only be used with 3274 Category A terminal port with PS Control and SFAP options of Configuration Support C or D. Cannot be installed with #5781 or #5782. Maximum: One. Field Installation: Yes. Prerequisites: #3610, #3880, and #9661. Customer Setup: No.

**Variable-Width Forms Tractor (#8700):** A forms feeding device for continuous margin-punched forms. Overall forms width from 76.2 to

## MACHINES

381.0mm (3 to 15 inches) can be fed. Maximum: One. Field installation: Yes. Prerequisite: #9185 where there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). Customer Setup: Yes.

## MODEL CONVERSIONS

Model 1C to 2C is field installable. Model changes from models 1 and 2 to models 1C and 2C are not recommended for field installation.

## ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order number indicated below.

**Forms Stand (#4450, P/N 8678375):** Available on a purchase-only basis. For shipment with machine, order #4450. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. Customer Setup: Yes. For field installation:

**Cables:** IBM shielded twisted pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787 and "Coaxial Cable and Associated Manual", GA27-2805.

- Assm 2577672 Cable Assembly In-Door
- Bulk 0323921 Coax Wire (Note 1)
- P/N 1836418 Connector Kit (Note 1)
- Assm 1833108 Cable Assembly Out-Door
- Bulk 5252750 Coax Wire (Note 2)
- P/N 1836419 Connector Kit (Note 2)
- P/N 1833104 Station Protector Kit, Carbon (Note 4)
- P/N 2621414 Modification Kit (Note 3)
- P/N 1833106 Station Protector Attachment Kit (Note 5)
- P/N 5252772 Station Protector Element Carbon (Note 6)
- P/N 5252643 Adapter (Note 7)
- P/N 1830818 Station Protection Kit, Gas (Note 4)
- P/N 5252899 Station Protector Element, Gas (Note 6)

Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.

## Notes:

1. Coax wire and one connector kit (includes two connectors P/N 1836446) required for each indoor cable assembly.
2. Coax wire and one connector kit (includes two connectors P/N 1836447) required for each outdoor cable assembly.
3. Customers replacing 2260s may utilize the existing installed cables by use of this modification kit. One kit required for each cable.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Replacement station protector elements.
7. Use to join two P/N 2577672 or two P/N 1833108 cable assemblies.

## SUPPLIES

**Ribbons:** A black ribbon cartridge, P/N 7032482 or equivalent is required for printing only black. A multi-colored ribbon cartridge, P/N 7032483 or equivalent, is required for color printing.

## 3287 PRINTER MODELS 11, 12

### PURPOSE

Provides hard copy output for the 8100 Information System or a 4331 Processor via Loop Attachment.

### MODELS 11, 12

**Model 11 011:** 80 cps maximum bidirectional print.

**Model 12 012:** 120 cps maximum bidirectional print.

**Note:** Actual printer throughput is dependent upon operational and system characteristics. Factors such as controller configuration and line transmission speed, output format, and programming application processing must all be considered in determining actual throughput.

**Prerequisites:** For direct attached Loop operation - #4830 or #4835 on the 8100 System, - #4830 or #4831 on the 4331 Processor. For data link attached Loop operation - #3842 or #3843 Loop Control Unit.

**Customer Setup (CSU):** The 3287 is designated as Customer Setup, thereby offering the customer early availability and relocation flexibility. For additional information on CSU, contact IBM.

### HIGHLIGHTS

The 3287 mdls 11-12 consist of LOOP communication functions, printer and indicator lights in one integrally designed desk-top unit. EBCDIC Dual Case Operation, Audible Alarm and Cancel Print are provided as standard functions. Variable-Width Forms Tractor and Friction-Feed Paper Handling are available as special features.

The printer operates in SCS mode, which provides for customer program-definable horizontal and vertical formatting, including line density (3, 4, 6 or 8 lines per inch).

Operator capability to set the page length, page depth and the line density from the operator panel is available via RPQ 8Q0070. To order an RPQ, contact IBM.

**Printer:** Maximum printer throughput is obtained with bidirectional serial matrix printing and indexing without unnecessary print head movement. The printer dot matrix is 4 of 7 wide by 8 high giving high legibility with character spacing at 10 to the inch. Line spacing is 3, 4, 6 or 8 lines to the inch. Up to 132 characters can be printed in a line. Up to 6-part forms with total thickness of 0.457mm (0.018 inches) may be used. For any multi-part or preprinted continuous forms, #8700 is recommended. 5- and 6-part continuous forms should be tried on an individual basis for acceptable feeding, registration and print quality. Maximum width is 381mm (15 inches); card stock forms are not recommended. (See GA24-3488 for forms specifications and limitations.)

#4110 is recommended for use with non-preprinted single part roll or fanfold paper, with a minimum width of 203mm (8 inches), when #8700 is not used. Maximum overall forms width is 378mm (14-7/8 inches); card stock forms are not recommended. (See GA24-3488 for forms specifications and limitations.)

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem determination and recovery routines and procedures that can be understood and used by the operator. See "Customer Responsibilities" below.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system and other vendor preparation.

2. Receipt at the customer's receiving dock, unpacking and placement of the 3287.
3. Physical setup, connection of cables, switch settings and checkout.
4. Notify IBM of intent to relocate and follow IBM instructions for relocation.
5. Use and follow the problem determination procedures and fill out trouble report prior to calling for IBM service.
6. Disconnecting, packing and removing to the customer shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.
7. Providing a desk or table top to support the 3287.
8. Procurement, installation and maintenance of the loop network.

**Communication Cable:** A communication cable (Loop Station Connector (LSC) cable) is provided as standard for attachment to a direct attached or data link attached loop. Standard cable is 3.7ms (12 ft) in length.

**Forms Handling:** #8700 or #4110 must be ordered for each 3287 mdl 11 or 12.

**Publications:** See "KWIC Index", GA20-1621, or specific system bibliography.

### SPECIFY

- **Power (AC, 1-phase):** Specify #2998 for all countries and then select one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #2800
	(includes 115V)
220V #2813	127V #2823
230V #2821	
240V #2801	Canada must specify #2800

- **Plugs:** The 3-digit Country Code on the DPMO is used to select a power plug which matches the most commonly used power supply in that country. If an exception to the above is required, a country RPQ may be initiated. For Japan and Canada: Specify #9890 for locking plug or #9891 for nonlocking plug. For details concerning power plugs refer to "IBM 3287 Printer - Planning and Setup Guide", GA18-2018.

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the country RPQ referenced above is initiated.

Canada will use the same power cords and plugs as used in the U.S.

- **Power Cord:** If standard 2.8m (9 ft) power cord is not desired, specify: #9511 for 1.8m (6 ft) power cord, #9512 for 3.7m (12 ft) power cord or #9513 for 4.5m (15 ft) power cord.
- **Carrier Rate:** One of the following must be specified: #9825 for up to 9600 bps -- #9829 for up to 38,400 bps.
- **Machine Nomenclature:** Available at time of manufacture only.

Brazilian #2933      French #2928  
Canadian

## MACHINES

French #2935      Japanese #2930  
English UK #2927    Spanish  
English US #2924    Speaking #2931

- Language: Specify one of the following: (Note 1)

Brazilian	#2775	
Canadian French	#2777	
EBCDIC	#2751	
English UK	#2758	
English US	#2756	
French	#2770	
International	#2750	
Japanese English	#2755	
Katakana	#2773	
Portuguese	#2749	
Portuguese (A)	#2741	(Note 2)
Spanish Speaking	#2769	

### Notes:

1. The Language specified must be the same as the transmission code/character set used on the control unit to which it is attached.
  2. Alternate character set (A) is provided for Portuguese to ensure compatibility with the existing 3271/3272 data files.
- Variable-Width Forms Tractor Paper Handling #9185: Specify if #8700 is ordered and there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). Prerequisites: #8700.
  - Blower (#9030): Must be specified for 3287 mdl 11 or 12 to be used in an environment above 32.3 degrees C (90 degrees F) ambient temperature (specification limits up to 40.5 degrees C (104 degrees F)). Field Installation: Yes.
  - Direct-Attach or Data Link-Attach: Identify Direct-Attach or Data Link-Attach by specifying one of the following:
    - Direct-Attached Loop Operation #9607
    - Data Link-Attached Loop Operation #9608
  - Hyphenation of Control Characters: To permit hyphenation of control characters upon receipt of individual control codes, specify #9424.

## SPECIAL FEATURES

One of the following two must be ordered, or both features may be ordered:

**Friction-Feed Paper Handling (#4110):** For friction feeding of a single part non-preprinted continuous and fanfold paper with a minimum width of 203mm (8 inches). Included in this feature is a paper tear bar for tearing continuous forms approximately 51mm (2 inches) above the print line. Feature #4110 is used interchangeably with the Variable-Width Forms Tractor and is attached and removed by the customer. Maximum: One. Field Installation: Yes. Customer Setup: Yes. Note: For applications that require forms skipping, #8700 is recommended.

**Variable-Width Forms Tractor (#8700):** A forms feeding device for continuous margin punched forms. Overall forms width from 76.2 to 381.0mm (3 to 15 inches) can be fed. Maximum: One. Field Installation: Yes. Prerequisite: #9185 where there is a requirement to handle forms with an overall width from 76.2 to 203.2mm (3 to 8 inches). Customer Setup: Yes.

## MODEL CONVERSIONS

Model 11 to 12 is field installable. Changes from models 1 and 2 to models 11 and 12 are not recommended for field installation.

## ACCESSORIES

Available on a purchase-only basis. For shipment with machine, order number indicated below.

**Forms Stand (#4450, P/N 8678375):** Available on a purchase-only basis. For shipment with machine, order #4450. Provides for stacking forms after printing. For forms stacking, use of the Forms Stand is recommended. Customer Setup: Yes. For field installation:

## SUPPLIES

**Ribbons:** P/N 1136653, or equivalent, is required. Also available is a black ribbon cartridge capability, order RPQ 8Q0199. The replacement ribbon cartridge P/Ns are 7034535 and 7032757.

## 3290 INFORMATION PANEL DISPLAY STATION

### PURPOSE

A high-function, large capacity, plasma-panel display station that attaches to a 3274 Control Unit. A member of the 3270 Display System family, the 3290 provides for the display of up to 9,920 alphanumeric characters in multiple-screen format options for use in entering data into and retrieving data from S/370 Processors, 4300 Processors, 9370 Processors and 8100 Information Systems.

### MODEL

**Model 1 001:** (WITHDRAWN FROM MARKETING and replaced with mdls 220 and 230. Cannot be ordered after December 6, 1985.)

**Model 220:** A slim profile display station that displays up to 9,920 characters and provides a Data/Typewriter keyboard. (Similar to the 3290 mdl 1 keyboard.)

**Model 230:** A slim profile display station that displays up to 9,920 characters and provides a Data/Typewriter keyboard with an integrated numeric keypad. (Similar to the 3179, 3180 keyboards.)

**Model T30:** A slim profile display station meeting TEMPEST specification NACSIM 5100A that displays up to 9,920 characters and provides a Data/Typewriter keyboard with an integrated numeric keypad. (Similar to the Mdl 230 keyboard but which is not customer modifiable and is available in English only.) Note: The second character of the AAS model number specifies which keyboard will be supplied. The number 2 specifies a standard keyboard and the number 3 specifies a keyboard with an integrated numeric keypad.

Note: Not applicable to Mdl T30 which is 100V, English only. Language option and voltage selection will be designated by the third character of the WT AAS model number:

Y	English US	100V
D	Canadian French	100V
F	Canadian English	100V
K	Japanese Katakana	100V
M	Japanese Katakana	200V
B	Japanese English	100V
C	Japanese English	200V
S	Spanish Speaking	100V
T	Spanish Speaking	200V

### Prerequisites:

1. A 3274 model 31A, 31C, 31D, 41A, 41C, 41D, 51C, or 61C with configuration support D at release level 64 or higher. (#9124 must be ordered against the 3274 for mdls 31X, 51C and 61C.)
2. Specify 3274 Load Diskette #9301 (except Katakana) or #9305 (Katakana, mdls 220 and 230 only). Note: Since this feature code diskette is used to support the 3290 mdl 001, 3290 mdl 220/230/T30, and 3179 mdl G, customers should read the diskette label to verify that the 3290 code is at Level D41.00 or higher which supports both models 1 and 220/230/T30. These feature codes must be ordered against the 3274, NOT the 3290.
3. A 3178, 3179, 3278 or 3279 Display Station with a keyboard must be attached to Port 0 of the control unit as a diagnostic unit.

### HIGHLIGHTS

The 3290 Information Panel Display Station provides a high level of visual display function for the IBM 3270 user. A member of the 3270 family, the 3290 incorporates a flat plasma panel as its display medium to provide a large capacity display for alphanumeric data and graphic images. The image displayed is orange on a black background and is uniform at every point of the viewing area. The 3290

uses microcode loaded from the 3274 Control Unit, to provide screen management facilities for improved operator usability. The 3290 is data-stream compatible with all models of today's 3270 displays in alphanumeric application environments and complements the 3270 product family by extending 3270 capability to include large screen and multiple screen application usage. Its flat panel allows compact packaging and provides a versatile display station.

- Large flat panel viewing area in small footprint package
  - Displays up to 9,920 characters -- 62 lines of 160 characters each. Characters are displayed within a 5x8 character matrix.
  - Alternate display of up to 5,300 characters -- 50 lines of 106 characters each. Larger characters displayed within a 7x9 character matrix.
  - Variable character spacing.
  - Multiple partitions (up to 16).
- Advanced Screen Management Facilities
- Multiple display capability
- Vertical scrolling in Native Mode
- 24K Character buffer
- Ruling, Row/Column Indicator, Zoom Operator Controls
- Intensify Options, i.e., Reverse Video, Underline or No Highlight
- Entry Assist Note: Entry assist is not supported with the Katakana Language.
- Two keyboards, one with an integrated keypad, with customer-modifiable layouts. (One keyboard with an integrated keypad and NOT customer modifiable for mdl T30.) Note: Customer modifiable keyboards are not supported with the Katakana language.
- Screen tilt
- String and Block copy of data Note: String and block copy is not supported with the Katakana language.
- Local copy
- Alert
- Ability to print 160 columns of data
- 3278 function
- Audible alarm
- Security keylock
- Programmed Symbols (six character sets)
- APL (see "Keyboard Accessory Keycap Kits")
- Response Time Monitor Note: RTM historical data stored in the 3274 Control unit cannot be viewed with a 3290 Information Panel but can be viewed by other authorized terminals attached to the Control unit.

The 3290 Information Panel attaches to a 3274 Control unit utilizing one physical port and up to five addresses, depending on the application. Up to 31 3290's can be attached to a 3274 depending on the application and 3274 model being used. The 3290 Information Panel attaches with the same coax cable that is used with other Category A terminals to attach to a 3274 Control Unit. Note: The 3290 mdl T30 requires a triax to coax adapter which must be supplied by the customer.

**Customer Setup (CSU):** The 3290 is designated as a customer setup machine. Setup instructions are included with each machine. (See manual GA23-0243 for mdls 220/230 or G23-0303 for mdl T30.)

IBM setup is available at IBM hourly rates and minimum charge.

**SPECIFY**

**Customer Responsibilities:** The customer is responsible for:

- Adequate site, system and other vendor preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Physical setup, connection of cables in customer access areas, switch settings and checkout.
- Performing customer problem determination.
- Removing customer-owned keycaps if a keyboard is replaced by an IBM Customer Engineer while performing on-site repair. (See "Keyboard Accessories".)
- Notify IBM of intent to relocate and follow IBM instructions for relocation.
- Assuring that for the 3290 mdl T30, the coaxial cable attachment and triax to coax adapter to the 3274 control unit also satisfies the electromagnetic data security requirements of Federal Specification NACSIM 5203. The adapter must be supplied by the customer.

**Warranty Service:** IBM On-Site Repair warranty service is provided under the Agreement For Purchase of IBM Machines and is available 24 hours a day, 7 days a week.

**Maintenance Service:** IBM On-Site Repair Maintenance Service is available under the IBM Maintenance Agreement at the applicable Minimum Maintenance Charge. The base period of Maintenance Service availability is 7 AM to 6 PM, Monday through Friday. Optional periods of Maintenance Service are available for additional charges.

To obtain this service a customer calls the IBM Service/Exchange Communication Center on the National Toll-free Number (800)428-2569. Once customer problem determination is completed, an IBM Customer Engineer will be dispatched to repair the failing unit.

There is no regularly scheduled preventive maintenance recommended by IBM on these units.

If an IBM maintenance agreement is not contracted for immediately following expiration of the service and parts warranty, and the customer subsequently wants maintenance coverage, the customer must have an IBM customer engineer inspect the machine. A minimum charge for the inspection, cleaning, and testing will be applied. In addition, all time and parts required to qualify the machine for maintenance agreement acceptability will be billed at IBM's then current rates and terms. The machine will then qualify for IBM maintenance agreement coverage.

If, on the basis of the inspection, IBM concludes that the machine is not repairable, no further work will be performed and a minimum charge will be applied.

**Publications:**

- "IBM 3290 Information Panel Description and Reference Manual" GA23-0241
- "IBM 3290 Information Panel Operators Guide" GA23-0242
- "IBM 3290 Information Panel Set Up Instructions (Mdl 220/230)" GA23-0243
- "IBM 3290 Information Panel Problem Determination Guide (Mdl 220/230)" GA23-0244
- "IBM 3290 T Information Panel Installation and Problem Determination Guide (Mdl T30)" GA23-0303
- "IBM 3290 Information Panel Maintenance Information Manual" GA23-0245 (All above shipped with the product.)
- See "Kwic Index", G320-1621, or specific system bibliography.

Specify codes are not required when ordering a 3290 mdl 220/230/T30. See descriptions of mdls 220, 230, or T30 in "Models" section of sales pages.

**Note:** All orders require specify #2998 for records purpose; mdl T30 available 100V, English only.

The 3 digit WT Country Code entered on DPMO will be used to select (default) the WT Country variables (power, power cable and keyboard/language) based on the specification most commonly used in that country. If the specify is not desired or if the default is not listed for your country, specify the appropriate code number from the lists below. **Note:** Mdl T30 available with 100V power and English language only.

If not specified otherwise, the 3290 will be shipped with the following:

- Power: #2804 for 100-127V, AC 1-phase, 3-wire, 50-60 Hz, Canada, Japan, Venezuela, Colombia, Mexico. #2806 for 200-240V, AC 1-phase, 3-wire, 50-60 Hz, Argentina and Australia.
  - Power line cord: 2.8m (9 ft), mdls 220 and 230 with the most commonly used plug for each country will be shipped with each machine. Refer to "IBM 3270 Information Display System Installation - Physical Planning Manual", (GA27-2787), for further information. For Canada and Japan, standard nonlocking plugs will be supplied. (For mdl T30 a 1.8m (6 ft) filtered cord with nonlocking plug will be shipped.)
  - Keyboard Language: The keyboard language will be designated by the third character of the model number. Refer to "Models" section of the sales pages for further information. Mdl T30 available English only.
  - Keyboard Types: The second character of the AAS model number specifies which keyboard will be supplied. Number 2 specifies a standard keyboard and number 3 specifies a keyboard with an attached numeric keypad.
  - Data/Typewriter Keyboard (mdl 220): The 3290 mdl 220 has a low-profile, customer-modifiable, EBCDIC typewriter-like keyboard with adjustable keyboard slope and coiled cable. There are 24 Program Function keys located in two rows across the top of the keyboard. Overlays are provided to permit users to identify functions assigned to these keys. Refer to the Type Catalog section for a pictorial view of the keyboard layout. Corequisite: None. Maximum: One keyboard can be attached at a time. Field Installation: Yes. (CSU) See "Field Keyboard Change" for descriptions.
  - Data/Typewriter Keyboard with Integrated Numeric Pad (mdl 230): The same keyboard as the Data/Typewriter keyboard described above but with 18 additional keys located to the right side of the keyboard in a calculator-like layout. Refer to the Type Catalog section for a pictorial view of the keyboard layout. Corequisite: None. Maximum: One keyboard can be attached at a time. Field Installation: Yes. (CSU) See "Field Keyboard Change" for descriptions.
  - Data/Typewriter Keyboard with integrated Numeric Keypad (mdl T30): The same keyboard layout as the mdl 230 keyboard described above but which is not customer modifiable. Field Installation: Yes. (CSU) See "Field Keyboard Change" for descriptions.
  - Mdl 220/230 Keyboards are Customer Modifiable: The keyboard layouts may be changed by using the 3290 mdl 220/230/T30 utility diskettes supplied with the 3274 Control Unit. Keyboards may be modified using the keyboard labels and new keycap kits. See "Keyboard Accessories" for kit descriptions.
- The keyboard modification function is explained in the "IBM 3290 Description and Reference Manual", GA23-0021.
- Japanese Katakana keyboards cannot be modified with the 3290 mdl 220/230/T30 utility diskette.

- Field Keyboard Change: If a new keyboard is required by a customer after the equipment is delivered, it may purchased

and ordered: by Parts and supplies requisition using part numbers listed below.

Keyboard Language	PART NUMBER		
	Keyboard w/Keypad (mdl 230)	Standard Keyboard (mdl 220)	Keyboard w/Keypad (mdl T30)
English US	1387001	1387033	6168254
EBCDIC US	1387113	1387173	NA
International	1387017	1387049	NA
Brazilian	1387005	1387037	NA
Canadian Fr	1387013	1387045	NA
Canadian Eng	1387009	1387041	NA
Japan Kat	1387025	1387057	NA
Japan Eng	1387021	1387053	NA
Span Speaking	1387029	1387061	NA

#### SPECIAL FEATURES (NONE)

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associate accessories.

Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", (GA27-2787) and "Coaxial Cable and Associated Manual", (GA27-2805).

The 3290 mdl T30 is provided with a six foot triax (RG22) communications cable. A correct adapter for attaching the triax to coaxial cable must be provided. Contact your IBM Marketing Representative for further details.

**Security Keys:** The 3290 is shipped with two keys for the keylock. Additional keys may be purchased from IBM. Key identification number must accompany each order. Key identification number can be found on the keylock. Supply both the key code and part number from the chart below for each key order.

Key Code	P/N	Key Code	P/N
P201	6423005	P206	6423010
P202	6423006	P207	6423011
P203	6423007	P208	6423012
P204	6423008	P209	6423013
P205	6423009	P210	6423014

Order additional keys on a PSR from your plant of manufacture.

**Note:** A letter of authorization with key identification numbers must accompany each order. Allow six to eight weeks for delivery. If the key identification number is unknown, the key lock assembly may be exchanged by your IBM customer engineer and billed on an hourly service basis.

**Keyboard Accessories:** Various keyboard accessories can be ordered as noted below but cannot be ordered or supplied with the initial factory order.

The following keyboard accessories can be ordered:

- Blank keycaps light color (P/N 1351710): 60 keycaps and removal tool.
- Blank keycaps dark color (P/N 1351728): 60 keycaps and removal tool.
- Clear lens keycaps for Write-on-Paper Insets (P/N 6341707): 60 caps with paper insets, 60 dark and 60 light, and removal tool.
- Paper insets for clear lens keycaps (P/N 6341704): 150 light and 150 dark.
- Keycap removal tool (P/N 1351717): 6 tools.
- APL keycap kit (P/N 1351711): English US (1 set and removal tool).
- Data Entry keycap kit, English US (P/N 1351741): 1 set and removal tool.
- PF keycap kit/87-key typewriter-like, English US (P/N 1351742): 2 sets and removal tool.
- PF keycap kit (P/N 1351736): PF1-PF24 blank on front (1 set and removal tool)
- Numeric keycap kit (P/N 1351738): 0 thru 9 plus Backspace, Front Tab, Back Tab, Space, Period, Comma, and Minus on top of keycaps. Front blank. Also 5 light and 8 dark colored blank keytops. (1 set and removal tool)
- Lower case \$ for JES2 etc (P/N 1351734): (SYS \$ on top of keycap, front blank) (SYS \$ on top of keycap, Erlnp on front face) (7 sets and removal tool)
- APL keycap kit, Canadian French (P/N 1351726): 1 set and removal tool.
- APL keycap kit, Japanese Katakana (P/N 1351718): 1 set and removal tool.
- APL keycap kit, Spanish Speaking (P/N 1351727): 1 set and removal tool.

#### SUPPLIES (NONE)

## 3299 TERMINAL MULTIPLEXER MODEL 1

(NO LONGER AVAILABLE)

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

A terminal multiplexer unit which can be used when connecting Category A Terminals to a 3274, or to the Workstation Adapter on the 4361 except for the 3274 mdl 51C. Using a 3299 reduces the cable requirements which provides for lower subsystem cabling costs and improved cabling flexibility. Also, the distance that a terminal may be located away from its 3274 is increased up to a maximum of 1,210m (4,000 ft) using shielded twisted-pair cable or 3,000m (9,840 ft) using coaxial cable. Each 3299 Terminal Multiplexer attaches up to eight Category A Terminals; therefore, four 3299s are required when attaching 32 terminals to a 3274 or to the Workstation Adapter on the 4361.

### MODEL 1

**Model 1 001:** Used with the 3299 Terminal Multiplexer Support specify option #9901 on 3274 mdls 41A, 41C, 41D and 61C or with 3299 Terminal Multiplexer Support RPQs 8K1155 and 8K1156 on a 3274 mdl 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C or 31D.

#### Prerequisites:

- #9901 Multiplexer Support on a 3274 mdl 41A, 41C, 41D or 61C.
- RPQ 8K1155 and/or 8K1156 on a 3274 mdl 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D.
- One 3299 is required for each group of eight Category A Terminals to be attached to a 3274.

**Customer Setup (CSU):** The 3299 is designated a customer setup unit. Setup instructions are included with each unit.

### HIGHLIGHTS

Using a 3299 Terminal Multiplexer eliminates the requirement for individual cables from a 3274 to each attached terminal. Only one cable is required between the 3274, or the Workstation Adapter on the 4361 and a 3299 which can be located up to 610m (2,000 ft) using shielded twisted pair or up to 1,500m (4,920 ft) using coaxial cable from a 3274, or the Workstation Adapter on the 4361. The 3299 can then attach up to eight Category A Terminals, each with its own cable. Each of these cables between the 3299 and a terminal can also be up to 610m (2,000 ft) using shielded twisted pair or 1,500m (4,920 ft) using coaxial cable. This permits terminals to be located up to a maximum of 1,210m (4,000 ft) using shielded twisted pair cable or 3,000m (9,840 ft) using coaxial cable from a 3274, or the Workstation Adapter on the 4361 or double the distance that is allowed when a terminal is attached directly to a 3274, or the Workstation Adapter on the 4361.

**Customer Responsibilities:** The customer is responsible for:

- Adequate site preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Setup of unit and connection of cables.
- Performing customer problem analysis and resolution (CPAR).
- Isolating a defective unit, replacement of unit, and delivering the defective unit with failure analysis report to an IBM Service/Exchange Center for exchange.
- Determination of the required number of spares.

**Spares:** It is recommended that the customer replace a failing 3299 unit with a spare unit and that the customer be advised to purchase sufficient spare 3299 units for such use. The number of spare units recommended is dependent upon the number of 3299 units the customer has installed, the application requirements, and the physical locations. Determination of the required number of spares is a customer responsibility, however, the minimum number of spare units recommended is shown in the table below:

#### Recommended Minimum Number of Spare 3299s:

Number of 3299s Installed	Spare 3299s
1 - 100	1
101 - 200	2
201 - 600	3
601 - 1,000	5

The customer should be advised to test spares for correct operation before storing them.

**Publications:** "3299 Terminal Multiplexer, Product Information Manual", (G520-4216).

**Basic Configuration:** Specify codes (except for Mandatory Specify #2998) are not normally required to order a 3299. The 3-digit Country Code entered on the DP machine order will be used to select (default) the Country variables (power cable, plug, etc.) based on the specification most commonly used in that country. If not specified otherwise, the 3299 will be shipped with the following:

- Power (AC, 1-phase, 50/60 Hz): One power supply satisfies all power requirements. The power supply operates, without any modifications or adjustments, at any voltage in the range of 100 to 240V at either 50 or 60 Hz.
- Power Cable: Each 3299 unit will be shipped with a 1.8m (6 ft) line cord and plug. The plug is determined by the country code.
- In countries where both 100 to 127 and 200 to 240V ranges are applicable a specify code must be used when a 200 to 240V power cable and plug is required (see below).
  - Only 100 to 127V power cable and plugs are available in these countries: Canada, Guyana, and Mexico.
  - Only 200 to 240V power cable and plugs are available in these countries: Afghanistan, Antigua, Argentina, Australia, Bangladesh, Brunei, Burma, Chile, Hong Kong, India, Malaysia, Nepal, New Zealand, Papua New Guinea, Paraguay, Peru, Singapore, Sri Lanka, Thailand, and Uruguay.
  - Both 100 to 127 and 200 to 240V power plugs are available. For these countries, a 100 to 127V power plug is provided (default) unless specify code #0500 is specified (see "Specify").
  - All other countries.

### SPECIFY

- Mandatory Specify #2998 - AG-A/PG order.
- 200 to 240V Power Plug: For these countries where both 100 to 127 and 200 to 240V ranges are used (see "Basic Configuration"), a 100 to 127V power cable and plug is provided (default) with the basic configuration. If a 200 to 240V power source is to be used, specify code #0500 must be specified to get a 200-240V power plug in lieu of the 100 to 127V power cable and plug normally provided.

## MACHINES

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

Twisted-pair cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System-Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation with your country.

Coaxial cable - For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual-Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

**IBM 3270 DPC-T3 Adapter (P/N 83X9758):** A cable adapter assembly that permits direct attachment to telephone twisted pair wire, that meets the IBM Cabling System Type 3 specifications, up to a maximum distance of 275m (900 ft.). It is 4.6m (15 ft.) in length with an IBM Dual Purpose Connector (DPC) at one end and a miniature six-pin modular telephone connector on the other end. The telephone connector can be cut off, and the wire inserted directly into telephone punch-down blocks that are capable of accepting stranded telephone wire. The accessory can also be used at the terminal end of the wire provided the terminal has an IBM Dual Purpose Connector (DPC). (Canada only) Otherwise, a CTPA is required. The IBM 3270 DPC-T3 Adapter is not required on the ends of telephone wires that attach to the terminal connectors of a 3299 Model 3. <)

**Ordering:** Order via NDD DRO or via Distributors authorized to market the IBM Cabling System components. Minimum order quantity is one package which contains ten IBM 3270 DPC-T3 Adapter assemblies.

### SUPPLIES (NONE)

## 3299 TERMINAL MULTIPLEXER MODEL 2

### PURPOSE

A 3299 Terminal Multiplexer Model 2 can be used to connect terminals to a 3174 Subsystem Control Unit, a 3274 Control Unit (except for the model 51C), a 4361 Workstation Adapter (WSA), or a 4702 Branch Automation Processor. Using a 3299 provides for lower subsystem cabling costs by reducing the cable requirements, gives improved cabling flexibility, and/or can extend the distances that terminals can be located away from a control unit. (Except Canada> A 3299 can be used with coaxial cable or the IBM Cabling System.<) (Canada only> A 3299 can be used with coaxial cable or the IBM Cabling System or with specified telephone twisted-pair (TTP).<) The maximum distance that a terminal can be located away from its control unit is 3,000m (9,840 ft) when using coaxial cable, up to 2,500m (8,200 ft) when using IBM Cabling System with a 3174 or 4702, up to 2,000m (6,560 ft) when using IBM Cabling System with a 3274 or (Except Canada> 4361.<) (Canada only> 4361 and up to 550m (1,800 ft) with specified telephone twisted-pair.<) Each 3299 can attach up to eight terminals, therefore, four 3299s are required when attaching 32 terminals to a control unit. An accessory is available for mounting 3299s in an equipment rack.

### MODEL 2 (CANADA ONLY> AND 3<)

**Model 2 002:** (Except Canada> Only the model 2 is available.<) It is used to connect terminals to 3174 Subsystem Control Units, 3274 Control Units (except the Model 51C), 4361 Workstation Adapters (WSA), and 4702 Branch Automation Processors. It is used with coaxial cable or the (Except Canada> IBM Cabling System.<) (Canada only> IBM Cabling System or with specified telephone twisted-pair using Coax-to-Twisted-Pair adapters (CTPA).<)

**(Canada only> Model 3 003:** Used to connect terminals to 3174 Subsystem Control Units, 3274 Control Units (except the Model 51C), 4361 Workstation Adapters, and 4702 Branch Automation Processors using specified telephone twisted-pair (TTP) between the 3299 and the terminals. Using the 3299 Model 3 eliminates the need for Coax-to-Twisted-Pair adapters (CTPA) on the TTP cable ends connecting to the 3299.<)

### Prerequisites:

- #9901 Multiplexer Support (or RPQ 8K1180, 8K1181, 8K1182 or 8K1183) on a 3274 model 41A, 41C, 41D or 61C.
- RPQ 8K1155, 8K1156 and/or 8K1194 on a 3274 model 1A, 1B, 1C, 1D, 21A, 21B, 21C, 21D, 31A, 31C, or 31D.
- No prerequisites are required on the 4361 WSA or the 3174 Subsystem Control Unit.
- One 3299 is required for each group of eight Category A Terminals to be attached.
- #3102 or #9638 Device Cluster Adapter on a 4702 Branch Automation Processor.

**Customer Setup (CSU):** The 3299 is designated as a customer setup unit. Setup instructions are included with each unit.

### HIGHLIGHTS

Using a 3299 Terminal Multiplexer eliminates the requirement for individual cables from a Control Unit to each attached terminal. Only one cable is required between the control unit and a 3299. The 3299 can then attach up to eight Category A Terminals each with its own cable.

When using coax cable, the 3299 can be located up to 1,500m (4,920 ft) from a 3174, 3274, 4702, or 4361 WSA. Each terminal can then be located up to 1,500m (4,920 ft) from the 3299. This permits terminals to be located up to a maximum of 3,000m (9,840 ft) from a Control Unit or double the distance that is allowed when a terminal is attached directly to a 3174, 3274, 4361 WSA, or 4702.

When using the IBM Cabling System, impedance matching devices (baluns) are not required on the 3299 end of a cable. The 3299 can be located up to 1,000m (3,280 ft) from a 3274. Each terminal can then be located up to 1,000m (3,280 ft) from a 3299. These distances assume one balun is used in the cable. Refer to the IBM Cabling System documentation for recommended maximum distances between offices and wiring closets.

(Canada only> When using specified telephone twisted-pair between a 3299 and the terminals, a 3299 Model 3 should be used because it eliminates the requirement for Coax-to-Twisted-Pair adapters (CTPA) on the cable ends connecting to the 3299. The TTP cables connect directly into the 3299 model 3. Each terminal can be located up to 275m (900 ft) from the 3299 Model 3.<)

**Customer Responsibilities:** The customer is responsible for:

- Adequate site preparation.
- Receipt at customer's receiving dock, unpacking and placement of unit.
- Setup of unit and connection of coax and/or IBM Cabling System cables
- Performing customer problem analysis and resolution (CPAR).
- Isolating a defective unit, replacement of unit, and delivering the defective unit with failure analysis report to an IBM Service/Exchange Center for exchange.
- Determination of the required number of spares.

**Spares:** It is recommended that the customer replace a failing 3299 unit with a spare unit and that the customer be advised to purchase sufficient spare 3299 units for such use. The number of spare units recommended is dependent upon the number of 3299 units the customer has installed, the application requirements, and the physical locations. Determination of the required number of spares is a customer responsibility, however, the minimum number of spare units recommended is shown in the table below:

### Recommended Minimum Number of Spare 3299s:

(Canada only> (Each 3299 Model should be considered separately.)<)

Number of 3299s Installed		Spare 3299s
1	-	100
101	-	200
201	-	600
601	-	1,000

The customer should be advised to test spares for correct operation before storing them.

**Publications:** "3299 Terminal Multiplexer, Product Information Manual", (G520-4216).

### SPECIFY

Except for Mandatory Specify #2998 (AG-A/PG order), specify codes are not normally required to order a 3299. The 3-digit WT Country Code entered on the DP Machine Order will be used to select (default) the WT Country variables (power cable, plug, etc.), based on the specification most commonly used in that country. If not specified otherwise, the 3299 will be shipped with the following:

- Power (AC, 1-phase, 50/60 Hz): One power supply satisfies all power requirements. The power supply operates, without modifications or adjustments, at any voltage in the range of 100 to 240 volts at either 50 or 60 Hz.

- **Power Cord:** Each 3299 unit will be shipped with a 1.8m (6 ft) cable and plug. The plug is determined by the country code. In countries where both 100 to 127 and 200 to 240 volt ranges are applicable, a specify code must be used when a 200 to 240 volt power cable and plug is required (see below).

Only 100 to 127 volt power cords are available in these countries: Canada, Guyana, Japan, Mexico, Nicaragua, and Surinam.

Only 200 to 240 volt power cords are available in these countries: Afghanistan, Antigua, Argentina, Australia, Bangladesh, Brunei, Burma, Chile, Hong Kong, India, Indonesia, Malaysia, Nepal, New Zealand, Papua New Guinea, Paraguay, Peru, Singapore, Sri Lanka, Thailand, Uruguay and W. Samoa.

All other countries: Both 100 to 127 and 200 to 240 volt power cords are available. For these countries, a 100 to 127 volt power cord is provided (default) unless specify code #0500 is specified. 200 to 240V Power Cord: For those countries where both 100 to 127 and 200 to 240V power sources are used (see "Basic Configuration"), a 100 to 127 volt power cord is provided (default) with the basic configuration. If a 200 to 240 volt power source is to be used, #0500 must be specified to get a 200-240 volt power cord in lieu of the 100 to 127 volt power cord normally provided.

#### SPECIAL FEATURES (NONE)

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

**Rack Mount (P/N 6217036):** An accessory is available to mount a 3299 in a 483mm (19 inch) wide equipment rack that complies with EIA and IEC standards. Cable guides are provided for cable dressing. Tools are not required for attaching a 3299 to the accessory.

**Cables:** IBM Cabling System cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**IBM Cable -** for proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide" (GA27-3361) and to "Using the IBM Cabling System With Communications Products" (GA27-3620). For pricing and ordering information, refer to the Systems Supplies operation with your country.

**Coaxial Cable -** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual-Physical Planning", GA27-2787.

**IBM 3270 DPC-T3 Adapter (P/N 83X9758):** A cable adapter assembly that permits direct attachment to telephone twisted pair wire, that meets the IBM Cabling System Type 3 specifications, up to a maximum distance of 275m (900 ft.). It is 4.6m (15 ft.) in length with an IBM Dual Purpose Connector (DPC) at one end and a miniature six-pin modular telephone connector on the other end. The telephone connector can be cut off, and the wire inserted directly into telephone punch-down blocks that are capable of accepting stranded telephone wire. The accessory can also be used at the terminal end of the wire provided the terminal has an IBM Dual Purpose Connector (DPC). (Canada only) Otherwise, a CTPA is required. The IBM 3270 DPC-T3 Adapter is not required on the ends of telephone wires that attach to the terminal connectors of a 3299 Model 3. <)

**Ordering:** Order via NDD DRO or via Distributors authorized to market the IBM Cabling System components. Minimum order quantity is one package which contains ten IBM 3270 DPC-T3 Adapter assemblies.

#### SUPPLIES (NONE)

**MACHINES**
**3310 DIRECT ACCESS STORAGE DEVICE**
**PURPOSE**

Direct access storage for attachment to a 4331 or 4361 Processor.

**MODELS**

<b>Model A1 A01</b>	Single-drive disk storage unit and associated control for attachment to a 4331 4331 or 4361 Processor via its DASD Adapter (#3201).
<b>Model A2 A02</b>	Two disk storage drives and associated control for attachment to a 4331 4331 or 4361 Processor via its DASD Adapter (#3201). It also provides the logic required to support the attachment of up to two additional drives for a maximum string of four.
<b>Model B1 B01</b>	Single-drive storage unit which attaches to a model A2 to provide for configurations requiring three drives.
<b>Model B2 B02</b>	Two disk storage drives which attach to a model A2 to provide for configurations requiring a full string of four drives.

**Maximum:** See 4331 or 4361 pages.

**Prerequisites:** A 3310 Direct Access Storage Drive requires a 3310 mdl A1 or A2 and a position on the DASD Adapter of a 4331 or 4361 Processor. A mdl A2 is required to attach a mdl B1 or B2.

**HIGHLIGHTS**

The 3310 employs a fixed storage medium and features high data rate, fast access, modularity and a high degree of reliability.

**Capacity:** Each drive has a capacity of 64,520,192 bytes.

**Format:** The 3310 uses Fixed Block data structure and the cylinder concept providing the following:

Bytes per Sector	512
Sectors per Cylinder	352
Bytes per Cylinder	180,224
Cylinders per Drive	358

**Access Time:**
**Seek Time (ms):**

Minimum	9
Average	27

**Rotational Delay (ms):**

Average	9.6
---------	-----

**Data Rate:** 1,031,000 bytes per second.

**Rotational Positioning Sensing:** Permits the disk storage device to disconnect during rotational delay, thereby increasing DASD Adapter availability for other operations.

**Error Correction:** Provides capability of correcting single data error bursts of up to 3 bits span as well as detecting all single error bursts of up to 14 bits span.

**Data Recovery:** (Plant only) Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided.

**SPECIFY**

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage:**  
(AC, 1-phase, 3-wire, 60 Hz): **#2732** for 200V, **#9902** for 208V, **#2803** for 220V, **#9914** for 240V.  
(AC, 1-phase, 3-wire, 50 Hz): **#2806** for 200V, **#2813** for 220V, **#2821** for 230V, **#2801** for 240V.  
**Note:** The 3310 meets the Japanese leakage for current requirements.
- Color (A mdls only):** **#9060** for willow green, **#9061** for garnet rose, **#9062** for sunrise yellow, **#9063** for classic blue, **#9064** for charcoal brown, or **#9065** for pebble gray. **Note:** One accent panel from the mdl A unit is exchanged with the outer side panel of the mdl B.

**Language Groups:**

Canadian English **#2934**  
Canadian French **#2935**  
English **#2927**  
French **#2928**

German **#2929**  
Italian **#2932**  
Japanese **#2930**  
Spanish **#2931**
**SPECIAL FEATURES (None)**
**TERMS and CONDITIONS**

Plan Offering: Plan D  
Purchase Option: 60%  
Machine Group: D  
Warranty: B  
Per Call: 3  
Termination Charge Percent: 25%

Termination Charge Months: 5  
Educational Allowance: Yes  
Initial Period of Maintenance Service: 3 Months  
Pre-Installation Test Allowance: 2 hours each

**MODEL CONVERSIONS**

Model changes between 3310 model A1 and A2 or between model B1 and B2 are field installable. Model changes between 3310 model A and model B units cannot be done.

**ACCESSORIES (None)**
**SUPPLIES (None)**

## 3330 DISK STORAGE

(NO LONGER AVAILABLE, as of March, 1984: Models, Model Changes, Specify Features, Special Features or Accessories. RPQs have not been withdrawn.)

### PURPOSE

Large capacity fast access, high data rate. Up to three 3330 modules attach to a 3333 Storage and Control to form a facility for general purpose data storage and programming system residence.

### MODELS

**Model 1 001:** Contains two disk storage drives; available on S/360 mdl 195, any S/370 processor except 3115, the 4331 Model Group 2 and the 4341, 4361, 4381, 9375 or 9377 Processor.

**Model 2 002:** Contains one disk storage drive; available on S/360 mdl 195, all S/370 processors except 3115, the 4331 Model Group 2 and the 4341, 4361, 4381, 9375 or 9377 Processor.

**Model 11 011:** Contains two disk storage drives; available on all virtual storage S/370 processors except 3115 and 3125, the 4331 Model Group 2 and the 4341, 4361, 4381, 9375 or 9377 Processor.

**Maximum:** Up to four 3330 modules, in any combination of mdls 1 and 2, can be attached to the 3830 mdl 1. Up to three 3330 modules, in any combination of mdls 1, 2 or 11, can be attached to the 3333 mdl 1 or 11; see system availability above. On the 3125, only one 3330 module, either mdl 1 or 2, can be attached to the 3333 mdl 1. For combinations allowed on a storage director of a 3880 Storage Control, see "Maximum" in M3880 pages.

**Prerequisites:** The 3330 mdls 1 and 2 are designed for interconnected operation with the 3333 mdl 1, 3333 mdl 11, or the 3830 mdl 1. The 3330 mdl 11 is designed for interconnected operation with the 3333 mdl 1 or mdl 11. Customers who wish to order a 3330 for stand-alone or individual use should submit an RPQ to provide the necessary safety elements (covers, cable connectors, etc.) to complete the unit for a non-standard (i.e., not installed as part of a 3330 facility) environment. In lieu of the RPQ, the customer may provide safety elements equivalent to the standard configuration or that provided by the above RPQ. If not provided, the unit will be offered on a purchase-only basis. See "Specify". See appropriate DASD storage control feature or machine to determine prerequisite specification and/or special features to attach 3333/3330s.

Agreement for IBM to install and maintain the 3330 in any non-standard configuration must be reviewed with IBM.

Each disk storage drive requires a 3336 Disk Pack. These must be ordered separately. Contact IBM.

### HIGHLIGHTS

Each drive uses an electromagnetic actuator to move and control the head assembly.

**Cylinder Concept:** 404 data cylinders per pack for mdls 1 and 2; 808 data cylinders per pack for mdl 11. Each cylinder has 19 data tracks; up to 13,030 bytes per track; up to 247,570 bytes available per cylinder.

**Data Rate:** 806,000 bytes per second.

**Access Time:** Average access time is 30ms with a minimum of 10ms and a maximum of 55ms.

**Power Drawers:** Each disk drive is mounted in a drawer; opened or closed by a switch on the operator control panel.

**Write Inhibit Switch:** A toggle switch for each drive, mounted on the operator's panel, provides the means to protect packs mounted within the facility from being written upon. The switch is manually set by the system operator under instructions from the customer operating procedure. Programming Support then protects the user's data by terminating a program which attempts to write to a protected drive.

**Write Format Release:** Standard feature on the mdl 11, which frees the subsystem while the drive erases from the end of a "formatted" write record to the end of the track.

**Rotational Position Sensing:** Enables a "seek" to an explicit position on a track; permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability; requires one unshared subchannel on a block multiplexer channel for each drive.

**Multiple Requesting:** Allows multiple channel command sequences to be active, up to one sequence per drive; permits better utilization of control unit, devices, channel and processor; requires one unshared subchannel on a block multiplexer channel for each drive.

**Disk Pack:** Each drive requires a 3336 Disk Pack. The 3336 mdl 1 provides up to 100 million bytes of storage per pack. The 3336 mdl 11 provides up to 200 million bytes of storage per pack. The 3336 mdl 1 is interchangeable on all 3330 mdls 1 and 2 and 3333 mdl 1 drives; it cannot be used with the 3330 mdl 11. The 3336 mdl 11 is interchangeable on all 3330 mdl 11 and 3333 mdl 11 drives; it cannot be used with the 3330 mdl 1 or 2.

**Publications:** GC20-0001

### SPECIFY

- Power (AC, 3-phase, 4-wire):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Non-Standard Environment: #9485 must be specified if the 3330 is not to be installed as part of a 3330 facility; also see "Prerequisites" above.
- Position Designator: For cable definition and drive identification (Ready Indicator and Logical Address Plug), one position designator code must be specified for each 3330, indicating its relative position as shown in the diagram below:

*-----*				
3830 mdl 1	#9491	#9492	#9493	#9494
-----	-----	-----	-----	-----
3333		#9492	#9493	#9494
*-----*				

**Note:** If any configuration change (increase or decrease) results in a position change of installed units, their position designator codes must be changed by MES for rental machines. For purchased machines, an RPQ must be submitted.

If an installed 3830 mdl 1/3330 configuration is being changed to a 3830 mdl 2/3330 series configuration and the 3330 with position designator code #9493 has serial number 12490 or below, B/M 2276789 (60 Hz) must be ordered via an MES for rental machines. For purchase machines, an RPQ must be submitted.

- Language Groups:



**MACHINES**

**M 3330.2**  
NOV 86

English	#2927	Italian	#2932
French	#2928	Spanish	#2931
German	#2929		

**ACCESSORIES (NONE)**

**SUPPLIES**

**MODEL CONVERSIONS**

Model 1 to model 11 is field installable.

Contact IBM.

## 3333 DISK STORAGE AND CONTROL

(NO LONGER AVAILABLE, as of March, 1984: Models, Model Changes, Specify Features, Special Features or Accessories. RPOs have not been withdrawn.)

### PURPOSE

Large capacity, fast access, high data rate storage for general purpose data storage and programming system residence with additional control for the attachment of up to three 3330 Disk Storage modules.

Two disk storage drives and associated control for attachment to the 3135, 3135-3, 3138 via the 3330 Series IFA (#4655), to the 3145, 3145-3, 3148 models H2, HG2, I2, IH2, and J2 via the ISC (#4660), to the 3145, 3145-3, 3148 models FED, GE, GFD, H, HG, and I via the 3345 models 3, 4, and 5, to the 3158, 3158-3, 3168, 3168-3 via the ISC (#4650), to the 3830 model 2 and to the 3880 mdl 1, 2 or 11. It provides logic and power for the attachment of up to six spindles of 3330 disk storage drives of any models.

### MODELS

**Model 1 001:** Contains two disk storage drives; available on S/360 mdl 195, any S/370 processor except 3115, the 4331 Model Group 2 and the 4341, 4361 or 4381.

**Model 11 011:** Contains two disk storage drives; available on any virtual storage S/370 processor except 3115 or 3125, the 4331 Model Group 2 and the 4341, 4361 or 4381.

**Maximum:** 3125: one 3333 mdl 1 (with associated 3330s). For other systems, see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, (Japan only >3158 (Submodel 2), <) 3158-3, 3168, 3168-3, 3031, 3032, 3033, 4341, 4361, 4381, 3345, 3830-2, 3830-3 or 3880 pages.

**Prerequisites:** Each disk storage drive requires a 3336 Disk Pack. These must be ordered separately. Contact IBM.

See appropriate DASD storage control feature or machine to determine prerequisite specify and/or special features to attach 3333/3330s.

Each system attachment requires a specify code. See "Specify" below.

**Note:** If a 3333/3330 configuration is replacing a 3830 mdl 1/3330 configuration (or any configuration change is made where installed 3330s are repositioned with respect to a 3333), the position designator specify codes of the 3330s must be changed via MES. See M3330 pages.

### HIGHLIGHTS

Each drive uses an electromagnetic actuator to move and control the head assembly.

**Cylinder Concept:** 404 data cylinders per pack for mdl 1; 808 data cylinders per pack for mdl 11. Each cylinder has 19 data tracks; up to 13,030 bytes per track; up to 247,570 bytes available per cylinder.

**Data Rate:** 806,000 bytes per second.

**Access Time:** Average access time is 30ms with a minimum of 10ms and a maximum of 55ms.

**Power Drawers:** Each disk drive is mounted in a drawer; opened or closed by a switch on the operator control panel.

**Write Inhibit Switch:** A toggle switch for each drive, mounted on the operator's panel, provides the means to protect packs mounted

within the facility from being written upon. The switch is manually set by the system operator under instructions from the customer operating procedure. Programming Support then protects the user's data by terminating a program which attempts to write to a protected drive.

**Write Format Release:** Standard feature on the mdl 11, which frees the subsystem while the drive erases from the end of a "formatted" write record to the end of the track.

**Rotational Position Sensing:** Enables a "seek" to an explicit position on a track; permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability; requires one unshared subchannel on a block multiplexer channel for each drive.

**Multiple Requesting:** Allows multiple channel command sequences to be active, up to one sequence per drive; permits better utilization of control units, devices, channel, and processor; requires one unshared subchannel on a block multiplexer channel for each drive.

**Disk Pack:** Each drive requires a 3336 Disk Pack. The 3336 mdl 1 provides up to 100 million bytes of storage per pack. The 3336 mdl 11 provides up to 200 million bytes of storage per pack. The 3336 mdl 1 is interchangeable on all 3333 mdl 1 and 3330 mdl 1 and 2 drives; it cannot be used with the 3333 mdl 11. The 3336 mdl 11 is interchangeable on all 3333 mdl 11 and 3330 mdl 11 drives; it cannot be used with 3333 mdl 1.

**Maintenance:** Agreement for IBM to install and maintain the 3333 in any non-standard configuration must be reviewed with CE Management prior to making a commitment to the customer.

**Publications:** GC20-0001

### SPECIFY

- Power (AC, 3-phase, 4-wire):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

**Note:** The 3333 requires a 60 amp AC power outlet. Consult Physical Planning Manual.

- System Attachment: One of the following must be specified:

Attachment	Specify
3125*	#9586
3135, 3135-3 IFA	#9582
3138 IFA	#9579
3145, 3145-3 ISC	#9583
3148 ISC	#9580
3158 ISC	#9584
3158 ISC w/#7220	#9587
3168 ISC	#9585
3168 ISC w/#7220	#9588
3345 mdls 3, 4, 5	#9583
3830 mdl 2	#9581
3830 mdl 3	#9589
3880 mdl 1, 2, 11	#9604

\* The 3125 is not valid for the String Switch (#8150).

- Language Groups:

## MACHINES

English #2927      Italian #2932  
French #2928      Spanish #2931  
German #2929

3830 mdl 3      #9599  
3880 mdl 1,2, or 11      #9605

**Note:** Installed 3333s retained for use with 3850 Mass Storage System:

## SPECIAL FEATURES

**Remote Switch Attachment (#8148):** To attach the String Switch (#8150) to a configuration control panel. Field Installation: Yes. Prerequisites: #8150.

**String Switch (#8150):** To attach the 3333 to a second attachment. The two attachments may be on the same processor or different processors and may be any two of the following: 3830 Storage Control mdl 2, 3135, 3135-3, 3138 3330/3340 Series IFA (#4655), the 3345 Storage and Control Frame mdls 3, 4 and 5 or the ISC (#4660) for attachment to 3145, 3145-3, 3148, and the 3158 and 3168 ISCs (#4650). See appropriate machines for additional requirements. The String Switch may also be installed on a 3333 within a 3850 Mass Storage System with attachment to a 3830 mdl 3 or 3158/3168 ISC (#4650) with Staging Adapter (#7220). Installation is not recommended in a mixed 3850 MSS/non-MSS environment. If a 3333 is shared between any two ISC paths and/or 3830 mdl 3s, then any other 3333s attached to the same ISC paths and/or 3830 mdl 3s must also be shared identically. In all of the above cases, switching between the two attachments is under program control. The 3333s may also be dedicated to a single attachment with an enable/disable switch. Field Installation: Yes. Specify: To indicate the second attachment to which this feature will be made, specify one of the following:

Attachment	Specify
3135, 3135-3 IFA	#9592
3138 IFA	#9601
3145, 3145-3 ISC	#9593
3148 ISC	#9602
3158 ISC	#9594
3158 ISC w/ (#7720)	#9597
3168 ISC	#9595
3168 ISC w/ (#7220)	#9598
3345 mdls 3,4,5	#9593
3830 mdl 2	#9591

System Attachment Specify Features must be changed on presently installed 3333s attached to a 3830 mdl 2 or 3158/3168 ISC (#4650), if the 3333s will be retained for use with a 3850 MSS when a 3830 mdl 2 is field upgraded to mdl 3 or Staging Adapter for ISC (#7220) is field installed on the 3158/3168 ISC. Submit MES(s) to effect the following:

Specify Feature Changes  
Remove      Install

#9581	#9589
#9584	#9587
#9585	#9588

If the installed 3333s are equipped with String Switch (#8150), the specify features indicative of String Switch attachment are also to be changed by MES:

Specify Feature Changes  
Remove      Install

#9591	#9599
#9594	#9597
#9595	#9598

## MODEL CONVERSIONS

Model 1 to model 11 is field installable.

## ACCESSORIES (NONE)

## SUPPLIES

Contact IBM.

## 3340 DIRECT ACCESS STORAGE FACILITY

(NO LONGER AVAILABLE as of March 1984: Mdl's B01 and C02, Model Changes, Specify Features, Special Features and Accessories are no longer available. RPQs are available.

(NO LONGER AVAILABLE as of August 1984: Mdl's A02 and B02, Model Changes, Specify Features, Special Features and Accessories are no longer available. RPQs are available.

### PURPOSE

Multiple capacity, high-speed, direct access storage for attachment to a S/3 mdl 12 or S/3 mdl 15 with B, C or D model Processing Unit, S/7 with E model Processing Unit, any virtual storage S/370, 4300, 9375 or 9377 Processor.

### MODELS

**Model A2 A02:** Two disk storage drives and associated control for attachment to a S/3 mdl 15, with B, C, or D model Processing Unit via native attachment, or a S/7 equipped with a 5988-T01, 3340 Attachment Module. It provides logic and power for the attachment of up to three 3340 mdl B units. Also for attachment to a 3115 or 3125 via their native attachments, to the 3135, 3135-3, 3138 via the IFA (#4655), to 3145 mdls GE, GFD, H, HG or I via the 3345 mdl 3, 4 or 5, to 3145 mdl H2, HG2, I2, IH2, J2, JI2 or K2, 3145-3, 3148 via the ISC (#4660), to the 4321 or 4331 via the 3340/3344 Direct Attach feature (#7851), to the 3158, 3158-3, 3168 or 3168-3 via the ISC (#4650), to the 3830 mdl 2, and to the 3880 mdl 1 or 2. It provides logic and power for the attachment of up to three 3340 mdl B units and/or 3344 units.

**Model B1 B01:** Contains one disk storage drive.

S/7, S/370 or 4300 processor: Up to three can be attached to a 3340 mdl A2 to provide 3-, 5- or 7-drive configurations. Can be combined with 3340 mdl A2, B2s and/or 3344 units for a 5-, 6- or 7-drive configuration.

S/3 mdl 15 with B, C, or D model processor: One can be attached to a 3340 mdl A2 to provide a 3-drive configuration.

**Model B2 B02:** Contains two disk storage drives.

S/7, S/370 or 4300 processor: Up to three 3340 mdl B2s can be attached to a 3340 mdl A2 for a 4-, 6- or 8-drive configuration. Can be combined with 3340 model A2, B1s and/or 3344 units for a 5-, 6- or 7-drive configuration.

S/3 Mdl 15 with B, C, or D Model Processor: One can be attached to a 3340 Mdl A2 to provide a 4-drive configuration.

**Model C2 C02:** Contains two disk storage drives.

S/3 Model 12: One can be attached directly to the 5412 to provide a 2-drive configuration.

### Maximum:

3115-0 - four 3340 drives  
3115-2 - eight 3340 drives  
3125-0 - eight 3340 drives  
3125-2 - sixteen 3340 drives  
Other S/370s, or 4300 processors - see M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 3345, 3830-2 or 3880-1,2 pages.

S/3 mdl 12 - two 3340 drives (C2), S/3 mdl 15B, 15C, or 15D - four 3340 drives, S/7 mdl E - eight 3340 drives.

**Prerequisites:** A 3340 facility requires: a 3340 mdl A2 (except S/3 mdl 12, which supports only 3340 mdl C2) -- a S/3 Mdl 15 with a B, C, or D mdl processor, S/7 with a 5998-T01 Module -- a S/370 or 4300 processor with appropriate attachment and features -- each 3340

drive requires a 3348 Data Module. A 3145 requires Word Buffer (#8810) to attach 3340s.

S/3: For conversion of a 5415A mdl CPU to a 5415B, 5415C, or 5415D mdl CPU, the MES must indicate deletion of #9400, and if a second 5444 is installed, deletion of #9401 or #9402.

See appropriate DASD storage control feature or machine to determine additional prerequisite specify and/or special features to attach 3340s.

### HIGHLIGHTS

- Each 3340 contains an air filtration system and the load/unload mechanism for the 3348 Data Module. Features low cost, multiple capacity, fast access and high data rate -- two drives (C2 only) attach to a S/3 mdl 12 -- up to 4 drives attach to a S/3 mdl 15 B, C or D, or a 3115-0 -- up to 8 drives attach to a S/7, to a 3115-2 or a 3125-0 -- up to 16 drives to a 3125-2 with 16 Drive Expansion (#9315), and up to 16 drives to a 4331. See M3135, 3135-3, 3138, 3145, 3145-3, 3148, 3158, 3158-3, 3168, 3168-3, 3031, 3032, 3033, 3345, 4331, 4341, 3830 or 3880 pages for other S/370 or 4300 processor attachment capabilities.
- The 3340 introduces a new design in which a sealed cartridge (3348 Data Module) contains the disks, access arms, read/write heads and spindle. Multiple capacity options on each drive become possible due to the modularity provided by this unique design. In addition, the 3348 mdl 70F contains fixed heads which provide low cost, fixed head capability for the 3340 user. Users may place selected components of IBM software as well as his own programs in the fixed head area to increase device performance. The 3348 mdl 70F requires the Fixed Head Feature (#4301) on the 3340. The 3348 mdl 70F is not available on the S/3 mdl 12 or mdl 15.
- The 3340 supports the command set of the 3330. This is essentially the same as the 2314 command set with minor modifications.

Cylinder	3348 mdl 70		
Concept:	3348 mdl 35 or 70F	3348 mdl 70	
	(34.9 MB)	(69.8 MB)	(41.0 MB)
	(Note 1)	(Note 1)	(Note 2)
Bytes per			
Track	8,368	8,368	12,288
Tracks per			
Cylinder	12	12	20
Cylinders			
per Data			
Module	348	696	210*
Bytes per			
Cylinder	100,416	100,416	245,760

Note 1: Mdl 35, 70 or 70F for S/7, S/370 or 4300 processors.

Note 2: Mdl 70 on S/3 mdl 12 or mdl 15.

\* Note: For the mdl 12 or 15, these are "logical" cylinders rather than physical cylinders. For capacities on the S/7, see S/7 under 3348.\*

**Data Rate:** 885,000 bytes per second. See GA09-1004 for Data Rate on S/7.

**Access Time:** For the 3348 mdl 35 and 70, the average seek time is 25 ms with a minimum of 10 ms and a maximum of 50 ms. For the mdl 70F, the average seek time is 0 ms for cylinders 1 through 5 while all other cylinders retain the above seek timing. Rotation time is 20.2 ms and latency is 10.1 ms, the same as for the 3348 mdls 35 and 70.

**Autoloading:** Data modules are automatically loaded after the Data Module is placed in the drive, the drive cover is closed and a switch is turned on. The Data Module is a sealed unit and requires no cover removal. Start up time is less than 20 seconds.

**Read-Only:** A switch is provided on every 3340 drive. This switch is activated by inserting a latch in the Data Module. When the latch is NOT inserted, the Data Module is protected from being written upon or erased.

**Data Modules:** Each drive requires a Data Module to operate. These must be ordered separately -- see M3348 pages.

3348 Data Module mdl 35 provides 34,944,768 bytes of storage for the S/370 and 4300 processors.  
3348 Data Module mdl 70 provides 69,889,536 bytes of storage for the S/370 and 4300 processors. For S/3 mdl 12 and mdl 15, it provides 41,041,920 bytes of main data storage plus 9,830,400 bytes for program support. Note: S/3 mdl 12 and mdl 15 can only utilize the 3348 Data Module mdl 70.  
3348 Data Module mdl 70F provides 69,889,536 bytes of storage of which 502,080 are accessible by fixed heads.

Either the mdl 35 or 70 may operate on any drive and they are interchangeable between drives, including drives with the Fixed Head Feature (#4301, 4302) installed. The mdl 70F, however, requires the Fixed Head Feature on the drive.

Data written on a Data Module by S/3 cannot be retrieved by S/370, and vice versa. Data written on a Data Module by a S/3 Mdl 12 or 15 may be used by a 4331 using the S/3 Data Import Feature (#6305).

**Bibliography:** GC20-0001

## SPECIFY

- Power (AC, 3-phase): (must be consistent with system voltage)

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Machine Nomenclature:

English #2927	Italian #2932
French #2928	Portuguese #2938
German #2929	Spanish #2931

- Color: Blue #9043 -- Gray #9045 -- Red #9041 -- White #9046 -- Yellow #9042.

- System Attachment: One of the following must be specified on each 3340 mdl A2:

Attachment	Specify
S/3 mdl 15*	#9589
S/7 mdl E	#9590
3830 mdl 2	#9581
3135 IFA	#9582
3135 mdl 3 IFA	#9582
3138 IFA	#9579
3345 mdls 3, 4, 5	#9583
3158 ISC	#9584
3880 mdl 1 or 2	#9607
3168 ISC	#9585
3125 DDA	#9586
3115 DDA	#9587
3145 ISC	#9588
3145 mdl 3 ISC	#9588
3148 ISC	#9580
4321, 4331 3340	

Direct Attach #9606

\* Note: Specify #9589 must also be used for a mdl B1 or B2 attached to the 3340 A2 to provide a 3 or 4-drive system.

- The following must be specified for a 3340 Mdl C2:

Attachment Specify

S/3 mdl 12 #9600

- If String Switch (#8150) is ordered or installed on 3340 mdl A2, String Switch (#9570) must be specified on each 3340 mdl B1 or B2 in the string.

## SPECIAL FEATURES

**Fixed Head Feature (#4301, #4302):** #4301 for mdl A2 or B2 -- #4302 for mdl B1. To operate the 3348 mdl 70F on the 3340. The Fixed Head Feature is available on S/7, S/370 VS systems from the 115 and up, and 4300 processors. Attachment is via the following: On S/7, via the 5998-T01. On the 3115 and 3125 via their native attachment, the 3830 Storage Control mdl 2, the 3880 Control Unit, the 3330/3340 Series IFA (#4655) on the 3135, 3135-3, 3138, the 3345 Storage Control Frame mdl 3, 4 or 5, the ISC (#4660) on the 3145, 3145-3, 3148, the ISC (#4650) on the 3158 and 3168, and the 4321 or 4331 via the 3340/3344 Direct Attach Feature (#7851). See appropriate machines for additional requirements. Limitations: Not available on 3340s attached to S/3 mdl 12 or mdl 15. Cannot be installed with either the 2311 mdl 1/3340 Series Compatibility (#8060) or the 2314/3340 Series Compatibility (#8070) on 3115 and 3125. Cannot be installed with Two-Channel Switch, Add'l (#8171) on the 3830 mdl 2 unless specify #9317 or #9310 is installed on the 3830. Field Installation: Yes.

- Remote Switch Attachment (#6148):** (Mdl A2) To attach the String Switch (#8150) to the configuration control panel of a 3158MP or 3168MP. Field Installation: Yes.

**Rotational Position Sensing (#6201, #6202):** #6201 for mdl B1 -- #6202 for mdl A2 or B2. Permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability. If required, it should be installed on every 3340 mdl A2, B2 or B1 in a string. Limitations: This feature may be installed but is not supported by the 4321 or 4331 processor 3340/3344 Direct Attachment Feature (#7851). Field Installation: Yes. Prerequisites: A block multiplexer channel on the system.

**String Switch (#8150):** (Mdl A2) To attach the 3340 mdl A2 to a second attachment. The two attachments may be on the same processor or different processors and may be any two of the following: 3830 Storage Control mdl 2, the 3880 Control Unit, the 3340 Direct Disk Attachment (DDA) on the 3115-2 or 3125-2, the 3330/3340 Series IFA (#4655) on the 3135, 3135-3, 3138, the 3345 Storage and Control Frame mdl 3, 4 or 5, the ISC (#4660) for attachment to the 3145, 3145-3, 3148, the ISC (#4650) for 3158 and 3168, and the 3340/3344 Direct Attachment Feature (#7851) on the 4321 or 4331. See appropriate machines for additional requirements. Switching between two attachments is under program control. The 3340 may also be dedicated to a single attachment with an enable/disable switch. Field Installation: Yes. Specify: To indicate the attachment to which this feature will be made, specify one of the following:

Attachment	Specify
3880 mdl 1 or 2	#9707
3830 mdl 2	#9591
3135, 3135-3 IFA	#9592
3138 IFA	#9601
3345 mdls 3, 4, 5	#9593
3145, 3145-3 ISC	#9593
4331	#9608
3148 ISC	#9602
3158 ISC	#9594
3168 ISC	#9595
3115-2 DDA	#9596
3125-2 DDA	#9597

In addition, String Switch (#9570) must be ordered on each 3340 mdl B1 or B2 which will be attached to the 3340 mdl A2 with String Switch (#8150).

**MODEL CONVERSIONS (NONE)**

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 3344 DIRECT ACCESS STORAGE

NO LONGER AVAILABLE as of March 1984: Model B2F, B2F Model Changes, B2F Specify Features, B2F Special Features and Accessories for B2F are no longer available. RPQs are available.

### PURPOSE

Dual drive, large capacity, direct access storage for attachment via a 3340 model A2 to a System/3 model 15D, to any virtual storage S/370, 4300, 9375 or 9377 Processor.

### MODELS

**Model B2 B02:** 2-drive disk storage unit which attaches to a 3340 model A2. It may be intermixed with 3340 model B units and/or 3344 model B2F units in any combination up to three B units per 3340 model A2. On System/3 model 15D, one 3344 B2 can be attached to a 3340 A2 to make a 4-drive system.

**Model B2F B2F:** (NO LONGER AVAILABLE) 2-drive disk storage unit with the same attachment capabilities as the 3344 mdl B2. It features Fixed Heads which provide 1,004,160 bytes of zero seek time storage on each drive.

**Limitations:** A 3340 string containing the 3344 may not be intermixed with a 3330 string on a 3135, 3135-3, 3138 IFA or 3880 mdl 1 or 2. 3340 strings containing the 3344 cannot be intermixed with 3330 or 3350 strings on a 3145, 3145-3, 3148, 3345, 3158, 3168 ISC or 3830 mdl 2.

Data written by System/3 cannot be retrieved by S/370, 4341 or 4381 processors, and vice versa. For the 4331 or 4361, see System/3 Data Import Feature (#6305).

**Maximum:** One 3340 string on a 3115-2/3125-2 DDA or on a 3135, 3135-3, 3138 IFA may contain 3344s.

Up to two 3340 strings on a 3830 mdl 2, 3880 mdl 2, 3145, 3145-3, 3148 or 3345 ISC, on each path of a 3158 or 3168 ISC, on each DASD adapter of the 4331 or on each director of 3880 mdl 1, 3880 mdl 1, may contain 3344s.

**Prerequisites:** A 3344 requires a 3340 mdl A2 and any virtual storage S/370 or 4300 processor with appropriate attachment and features. Control Store Extension (#2150) and Register Expansion (#6111) are prerequisite features on the 3830 mdl 2 and 3145, 3145-3, 3148, 3345, 3158, 3168 ISCs to attach 3344. On the 3115-2 and the 3125-2, 4K DASD Control Storage Extension (#4210) is required. On 3880, 3340/3344 Attachment feature is required.

For use with System/3 mdl 15D, a 5415D with specify #9781 and #9784 and a 3340 mdl A2 are required.

**IMPORTANT:** See the appropriate DASD storage control feature or machine to determine any additional prerequisite specify and/or special features to attach 3344.

### HIGHLIGHTS

- The 3344 features a large capacity, fixed storage medium. Each drive is equivalent in capacity and format to four logical 3348 mdl 70s. Each 3344 has two drives and requires eight logical device addresses. The Fixed Head storage capacity on the 3344 mdl B2F is associated with the first of the four logical volumes on each drive.
- On S/3 mdl 15D, each drive is approximately equivalent to four logical 3348 mdl 70s - each logical volume features a larger main data area, and a smaller area reserved for simulation, than on a 3348 data module.

**Cylinder concept:** Except for System/3, each drive has 2,784 logical cylinders with 12 tracks per cylinder. Maximum track capacity is 8,368 bytes providing up to 100,416 bytes per logical cylinder.

For the System/3 mdl 15D, each drive has 828 logical cylinders with 20 tracks per cylinder. Maximum track capacity is 12,288 bytes providing up to 245,760 bytes per logical cylinder.

Maximum drive capacity is 203,489,280 bytes. Data Rate - 885,000 bytes per second.

The 3344 mdl B2 provides 279,558,144 bytes of storage per drive.

The 3344 mdl B2F provides 279,558,144 bytes of storage per drive of which 1,004,160 bytes are accessible by fixed heads.

**Data Rate:** 885,000 bytes per second.

**Access Time:** Average seek time is 25ms with a minimum of 10ms and a maximum of 50ms. Rotation time is 20.2ms and latency is 10.1ms. For the 3344 mdl B2F, logical cylinders 1 through 10 of the first logical volume on each drive have a seek time of zero ms while all other cylinders retain the above seek timing.

**Read-Only:** A 2-position switch is provided for each drive. When the switch is in the "read only" position, the drive is protected from being written upon or erased.

**Rotational Position Sensing (RPS):** A standard feature on the 3344 which permits channel disconnect during most of the rotational latency period and thus contributes to increased channel availability. Requires a block multiplexer channel on the system. If RPS is used, it is advisable for efficient operation to also have it on every 3340 in a string.

**Data Recovery:** (Plant only) Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

**Alternate Tracks:** Except for System/3, there are 96 alternate tracks per drive. The 3344 will be shipped from the plant with not more than five flagged tracks per drive. Therefore, a minimum of 91 alternate tracks per drive are available for customer use.

For the System/3 mdl 15D, there are 160 alternate tracks per drive (40 per logical volume). The 3344 will be shipped from the plant with not more than five flagged tracks per drive. Therefore, a minimum of 155 alternate tracks per drive are available for customer use.

**Publications:** S/370 and 4300 processors -- GC20-0001; System/3 -- GC20-8080.

### SPECIFY

- Power (AC, 3-phase): (must be consistent with system voltage)

50 Hz		60 Hz	
200V	#2807	200V	#2733
220V	#2815	208V	#9903
235V	#2818	230V	#9905
380V	#2816		
408V	#2819		

- Machine Nomenclature:

English	#2927	Italian	#2932
French	#2928	Japanese	#2930
German	#2929	Spanish	#2931

## MACHINES

- Color: Blue #9043; Gray #9045; Red #9041; White #9046; Yellow #9042.
- System Attachment: One of the following must be specified on each 3344 mdl B2/B2F.

3148 ISC #9580  
3880 mdl 1 or 2 #9607

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS

Changes from model B2 to model B2F are field installable. Note: Customer price quotations and customer acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

Attachment	Specify
3830 mdl 2	#9581
3135 IFA	#9582
3135 mdl 3 IFA	#9582
3138 IFA	#9579
3345 mdls 3, 4, 5	#9583
3158 ISC	#9584
4331/4361	#9606
System/3	#9589
3168 ISC	#9585
3125 DDA	#9586
3115 DDA	#9587
3145 ISC	#9588
3145 mdl 3 ISC	#9588

## 3350 DIRECT ACCESS STORAGE

### PURPOSE

High-speed, large capacity, direct access storage for attachment to any virtual storage S/370 Processor (except 3115 or 3125), 30XX Processor, 4331 (Model Group 2), 4341, 4361, 4381, 9375 or 9377 Processor.

### MODELS A2, A2F, B2, B2F, C2, C2F

**Model A2 A02:** Two-drive disk storage and associated control for attachment to 3145 mdl GE, GFD, H, HG or I via the 3345 mdl 3, 4 or 5, to the 3145 mdl H2, HG2, I2, IH2, J2, JI2 or K2 via the ISC (#4660), to the 3145-3 or 3148 via the ISC (#4660), to the 3158 or 3168 via the ISC (#4650), to the 3830 mdl 2 or 3, to the 3880 mdl 1, 2 or 11. It provides logic and power for the attachment of up to three 3350 mdl B2/B2F units or up to two mdl B2/B2F units and one C2/C2F unit.

**Model A2F A2F:** Two-drive disk storage and associated control with the same attachment capabilities as the mdl A2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage on each drive in lieu of the same capacity under the moving heads.

**Model B2 B02:** 2-drive disk storage unit. Up to three 3350 mdl B2/B2Fs can be attached to a 3350 mdl A2/A2F.

**Model B2F B2F:** Two-drive disk storage unit with the same attachment capabilities as the mdl B2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage in each drive in lieu of the same capacity under the moving heads.

**Model C2 C02:** Two-drive disk storage and associated control. Provides an alternate controller function within a 3350 string. The mdl C2 functions as a mdl A2 or B2 depending upon the setting of a manual switch on the unit. A 3350 string containing a mdl C unit requires a mdl A unit with Primary Controller Adapter (#1320) and may include 0, 1 or 2 mdl B2/B2F units.

**Model C2F C2F:** 2-drive disk storage and associated control with the same attachment capabilities as the mdl C2. It features Fixed Heads which provide up to 1,144,140 bytes of zero seek time storage in each drive in lieu of the same capacity under the moving heads.

**Maximum:** See M3145, 3145-3, 3148, 3158, 3168, 3345 ISCs, 3830 mdl 2 or 3, 3880, 9370 pages.

**Prerequisites:** A 3350 DAS requires a 3350 mdl A2 or A2F; any virtual storage 4331 (Mdl Group 2), 4341, 4361 or 4381 processor or S/370 processor (except 3115 or 3125) with appropriate attachment and features. A 3145 requires Word Buffer (#8810) (standard on 3148 and a prerequisite to 3145-3) to attach 3350s. Expanded Control Store (#2151), Control Store Extension (#2150), and Register Expansion (#6111) are required on the 3830 mdl 2 or 3158, 3168 ISCs to attach 3350. Expanded Control Store (#2152) and Register Expansion (#6111) are required on the 3145, 3145-3, 3148 or 3345 ISCs, or 3830 mdl 3 to attach 3350.

**Note:** See the appropriate DASD storage control feature or machine to determine any additional prerequisite Specify and/or Special Features to attach a 3350.

### HIGHLIGHTS

- The 3350 features high data rate, fast access, multiple formats and low cost per byte. It employs a fixed storage medium.
- Selective Format: Drive format may be 3330 mdl 1 or 3330 mdl 11 compatibility mode or 3350 native mode. Format is specified at time of order by individual drive. Format changes may be made by CE in the field. In 3330 mdl 1 or mdl 11 compatibility mode the Fixed Head storage capacity on the mdl A2F, B2F and C2F is 742,710 bytes per drive. In 3330 mdl 1 com-

patibility mode this Fixed Head storage capacity is associated with the first of the two logical 3330 mdl 1 volumes on each 3350 drive. In 3350 native mode Fixed Head storage capacity on the mdl A2F, B2F and C2F is 1,144,140 bytes per drive.

Cylinder Concept:	3330 Mdl 1 Mode	3330 Mdl 11 Mode	3350 Native Mode
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Bytes per Track	13,030	13,030	19,069
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Tracks per Logical Cyl.	19	19	30
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Logical Cylinders per Drive	2x404	808	555
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Approx. capacity/drive (MB)	2x100	200	317.5
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- Data Rate: 1,198,000 bps.
- Access Time: Average seek time is 25ms with a minimum of 10ms and a maximum of 50ms. Average rotational delay is 8.4ms. For 3350 mdl A2F, B2F and C2F cylinders 1 and 2 (3350 Native Mode), or cylinders 1 through 3 (3330 mdl 11 compatibility mode), or cylinders 1 through 3 of the first of the two logical volumes on a drive (3330 mdl 1 compatibility mode), have a seek time of zero ms. All other cylinders retain the above seek timing.
- Error Correction: Provides capability of correcting single data error bursts of up to four bits span as well as detecting all single error bursts of up to ten bits span.
- Write Format Release: Frees the subsystem while the drive erases from the end of a formatted write record to the end of the track.
- Rotational Position Sensing: Permits channel disconnect during period of rotational latency, thereby providing greater channel availability -- requires one unshared subchannel on a block multiplexer channel for each logical device.
- Command Retry: Enables the storage control to recover from certain subsystem errors without recourse to system error recovery procedures.
- Read Only: A two position switch is provided for each drive. When the switch is in the "read only" position, the drive is protected from being written upon or erased.
- Data Recovery (Plant Only): Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.
- Flag Free: The 3350 will be shipped flag free.

**Publications:** GC20-0001

### SPECIFY

- Power (AC, 3-phase):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905

## MACHINES

380V #2816  
408V #2819

- Language:

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.

- Format:

	First	Second
	Drive	Drive

3330 mdl 1		
Compatibility Mode	#9731	#9732
3330 mdl 11		
Compatibility Mode	#9741	#9742
3350 Native Mode	#9751	#9752

- #9608 must be specified for attachment to a 3880 mdl 1 or 11 Storage Control Unit.

**Note:** In addition to the standard control attachment (#9608) for a 3880 mdl 1 or 11 Storage Control Unit, mdl A2/A2F with string switch (#8150) attaching to another 3880 mdl 1 or 11 Storage Control Unit must specify (#9608) a total of twice. Mdl C2/C2F with string switch (#8150) attaching to a 3880 mdl 1 Storage Control must specify (#9608) only once.

## SPECIAL FEATURES

**Primary Controller Adapter (#1320):** (Mdl A2, A2F) Permits selection/deselection of the controller of the A2/A2F unit as the on-line controller via a manual switch on the C2/C2F unit in the string. Maximum: One per A2/A2F unit. Field Installation: Yes. Corequisites: One C2 or C2F unit in the string.

**Remote Switch Attachment (#8148):** (Mdl A2, A2F, C2, C2F) To attach the String Switch (#8150) to the configuration control panel of a S/370 mdl 158MP or 168MP. Field Installation: Yes.

**String Switch (#8150):** (Mdl A2, A2F, C2, C2F) To link the 3350 to a second attachment. The two attachments may be on the same CPU or different CPUs and may be any two of the following: 3830 Storage Control mdl 2 or 3, 3880 Storage Control mdl 1, 2 or 11, the 3345 Storage and Control Frame mdl 3, 4 or 5, or the ISC (#4660) for attachment to S/370 mdl 145, 145-3 or 148, or the ISC (#4660) for attachment to S/370 mdl 158 or 168 -- see appropriate machines for additional requirements. Switching between the two attachments is under program control. The 3350 may also be dedicated to a single attachment with an enable/disable switch. Limitations: See 3880 mdl D11 for restriction on use of #8150 when attached to the paging storage director. Field Installation: Yes. Specify: The attachment to which this feature will be made must be indicated -- see "Specify" for System Attachment.

## MODEL CONVERSIONS

Model changes between 3350 mdl A and mdl B units, or mdl C and mdl B units are available at time of manufacture only. Model changes between 3350 mdl A and mdl C units are not recommended for field installation. Model changes between A2 and A2F units, or B2 and B2F units, or C2 and C2F units are field installable.

**Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this mdl change involves the removal of parts which become the property of IBM."

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3363 OPTICAL DISK DRIVE

### PURPOSE

The IBM 3363 Optical Disk Drive is a new high-performance removable disk storage device. It utilizes the high density characteristics of optical storage technology to achieve very high capacity (200Mb) on a small 130mm (5.25-inch) removable disk. It is designed to attach to the IBM PC, PC/XT, Portable, PC/AT, PC/3270, AT/3270, and all models of the IBM Personal System/2 via a special controller card connecting to the PC I/O Bus. Two drives can be attached to a single controller card. Depending on the IBM PC model, from one to four controller cards can be supported yielding from 200Mb to 1.6Gb of removable, write once, online storage capacity. The 3363 consists of three models (A01, A11, and B01) which are external stand-alone units. There is also an internal optical disk drive for 8560 and 8580 only. This drive is #8700 on those models. The device software contains a file driver providing commands which are compatible with most PC/DOS magnetic disk commands. It also provides extensions to PC/DOS supporting multiple versions of files and files of greater than 32Mb. The 3363 is recommended as a supplement to a fixed-disk for higher capacity storage, and for applications where removability of the disk is important (e.g., security, archive, portable data, and personal disks for individual uses).

### MODELS

**Model A01:** The Model A01\* attaches to current IBM PCs and the 8530 as the first drive.

**Model A11:** The Model A11\* attaches to the 8550, 8560, and 8580, as the first drive.

**Model B01:** The Model B01 attaches to Models A01, A11, and #8700 as a second drive.

**#8700 Feature\*:** Attaches as an internal drive on 8560 and 8580 only.

\* Includes the controller card.

### Limitations:

- Not compatible with the IBM XMA Card.
- Not compatible with any version of TopView.

**Maximum:** Up to two drives may be attached to a single controller card. The current IBM PCs plus the 8530 will support one controller card and a maximum of two drives. The 8550 will support up to three controller cards and a maximum of six drives, while the 8560 and 8580 will support up to four controller cards and a maximum of eight drives.

**Prerequisites:** An IBM PC using PC/DOS 3.2 and higher. Minimum storage requirements for the File System Driver is 105K. Total storage requirements should be reviewed in order to determine if the 3363 File System Driver will impact current or planned applications.

**Customer Setup (CSU):** Yes.

### HIGHLIGHTS

- Provides 200Mb of storage per cartridge.
- Up to 8 drives can be attached depending on PC model.
- Supports PC applications which use Interrupt 21 DOS Read/Write commands.
- Supports multiple versions of the same name file.
- Supports file sizes greater than 32Mb.

- Burst data rate of 2.5M bps at the read amplifier.
- Average seek over 1/3 of the disk is less than 230ms.
- Shorter average seek for up to 101 tracks is less than 45ms.

### DESCRIPTION

The 3363 Optical Disk Drive is a mass storage device designed specifically for IBM Personal Computers. It should be viewed as a supplement to a fixed disk, and for applications where removability of the disk is important (e.g., security, archive, backup, etc.).

The 3363 is available as both external models and internal feature. The external drive is a stand-alone unit with its own power supply, while the internal feature derives its power from the PC. The 3363 can be attached to most current models of the IBM PC as well as all models of the IBM Personal System/2. The exceptions are: PCjr, PC Convertible, the PC/370 models, and the RT PC. The 3363 attaches to the IBM PC via a new controller card which plugs into the system board and is connected to the PC standard I/O Bus. One or two drives can be attached to the controller card.

The 3363 utilizes a small 130mm (5.25-inch) write once, removable optical disk, housed in a protective cartridge. The optical disk is a plastic media with recording on one side. The cartridge has a 200Mb capacity. Depending on the PC model from one to eight 3363 Optical Disk Drives may be attached yielding a total of 200Mb to 1.6Gb of online direct access storage.

The 3363 utilizes a spiral format consisting of 512-byte sector, 23 sectors per track, and 17,100 tracks. Data is read or written using a Laser Read/Write head. The IBM Optical Disk Cartridge can be pre-recorded with data much like diskettes are today. Thus, large electronic text or databases can be distributed on a reliable media that can also be updated as the data changes.

The 3363 has a burst data rate of up to 2.5M bps at the output of the read amplifier, with peak data transfer rate being a function of the attaching system. Data is recorded contiguously along the spiral starting at the first available sector. The user application can optimize performance by taking advantage of this recording technique to produce a 64Kb streaming effect, when doing large sequential transfers of data, with a single command.

Average seek time over one-third of the disk surface (5,700 tracks; 67Mb) is less than 230ms. The 3363 also has a shorter average seek time of less than 45ms for up to 101 tracks (1.2Mb). This is accomplished by simply changing the angle of the laser beam.

The 3363 is supported by new software and optical BIOS which provide extensions to DOS. The software design incorporates a directory structure that optimizes the directory search speed and the disk space utilization. The directory design in conjunction with a new File System Driver makes the 3363 appear rewritable to the user application. The software support also provides compatibility with most DOS commands.

New functions such as multiple versions are available with the 3363 software. With this support the user can keep back versions of the same file name. Manipulation of versions is supported by new commands designed to look like standard DOS commands. They provide the hooks to enable user applications to take advantage of the versions capability for any file. Another new function, provided by the 3363 software support, is the ability to create data files greater than 32Mb in size. This provides flexibility in the user's capability of using the 200Mb capacity of the IBM Optical Disk Cartridge. There is also a new Save/Restore function allowing the user to save only changed data files while maintaining the integrity of the directory structure. This ability, together with versions support, provides users with an automatic audit trail and archive for future reference. Restoring data files can be accomplished by file name, a particular version of a file, all versions of a file, or all files.

## MACHINES

### Physical Specifications:

External Drive (A01, A11, and B01).

Width: 226mm ( 8.7 in.)  
Depth: 422mm (16.6 in.)  
Height: 138mm ( 5.45 in.)  
Weight: 6.75kg (14.875 pounds)

### Operating Environment:

3363 Drive:

Temperature: +15.6 to 32.6 degrees C max (60 to 90 degrees F max)  
Relative Humidity: 8 to 80 percent  
Wet Bulb: +23.8 degrees C (74.8 degrees F max)

3363 Optical Disk Cartridge:

Temperature: +10.0 to 51.6 degrees C max (50 to 125 degrees F max)  
Relative Humidity: 8 to 80 percent  
Wet Bulb: +29.4 degrees C (84.9 degrees F max)

### Publications:

- GC35-0104 Guide to Operations
- SY32-7007 Hardware Maintenance Service
- SY32-7012 Technical Reference Manual

The following publications are available from Vimercate at General Availability:

- 68X-7925 (Danish) Guide to Operations

- 68X-7929 (Dutch) Guide to Operations
- 68X-7920 (English) Guide to Operations
- 68X-8204 (English) Hardware Maintenance Service
- 68X-8162 (English) Technical Reference Manual
- 68X-7927 (French) Guide to Operations
- 68X-8224 (French) Hardware Maintenance Service
- 68X-7921 (German) Guide to Operations
- 68X-8245 (German) Hardware Maintenance Service
- 68X-7928 (Italian) Guide to Operations
- 68X-8266 (Italian) Hardware Maintenance Service
- 68X-7922 (Spanish) Guide to Operations
- 68X-8443 (Spanish) Hardware Maintenance Service
- 68X-7931 (Swedish) Guide to Operations

### SPECIFY (NONE)

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES

IBM 3363 Optical Disk Cartridge (P/N 63X4199)

## 3370 DIRECT ACCESS STORAGE

### PURPOSE

High-speed, large-capacity, fixed-media, direct access storage for attachment to a 4331, 4341, 4361, 4381, 9375 or 9377 Processor, the 3092 Processor Controller or System/38 5381 System Unit.

### MODELS

**Model A1 A01:** (NO LONGER AVAILABLE) Single drive disk storage with two actuators and associated control for attachment to the 4331, 4341, 4361 or 4381 Processors. It provides logic for the attachment of up to three 3370 mdl B1 units on the and 4331, and for the attachment of up to three model B1 and/or B2 units intermixed in any combination to the 4331 (model groups 11 and 2), 4341, 4361, 4381, 9375 or 9377 Processors.

**Model A2 A02:** Single drive disk storage with two actuators and associated control for attachment to 4331 (model groups 11 and 2), 4341, 4361, 4381, 9375 and 9377 Processors and the 3092 Processor Controller. The mdl A2 provides logic for attachment of up to three 3370 mdl B1 or B2 units inter-mixed in any combination.

**Model B1 B01:** (NO LONGER AVAILABLE) Single drive disk storage with two actuators. Up to three 3370 model B1 units may be attached to a 3370 mdl A1 or mdl A2.

**Model B2 B02:** Single drive disk storage with two actuators. Up to three 3370 mdl B2 units may be attached to a 3370 mdl A1, when attached to a 4331 (model groups 11 and 2), 4341, 4361, 4381, 9375 or 9377; or 3370 mdl A2.

**Model A11 A11:** (NO LONGER AVAILABLE) Single drive disk storage with two actuators and associated control for attachment to System/38 5381 System Unit (mdls 4, 5, 6, 7 and 8 only) with a 3370 Attachment Adapter. The mdl A11 provides logic and power for the attachment of up to three 3370 mdl B11 units or B12 units intermixed in any combination.

**Model A12 A12:** Single drive disk storage with two actuators and associated control for attachment to System/38 5381 System Unit (mdls 4, 5, 6, 7, and 8) with a 3370 attachment adapter. The mdl A12 provides logic and power for the attachment of up to three 3370 mdl B11 or B12 units intermixed in any combination.

**Model B11 B11:** (NO LONGER AVAILABLE) Single drive disk storage with two actuators. Up to three 3370 mdl B11 units may be attached to a 3370 mdl A11 or A12.

**Model B12 B12:** Single drive disk storage with two actuators. Up to three 3370 mdl B12 units may be attached to a 3370 mdl A11 or A12.

**Maximum Configuration:** See M3880, 4331, 4341, 4361, 4381, 9370 or System/38 5381 pages.

**Prerequisites:** A 3370 mdl B1 or B2 requires a 3370 mdl A1 or A2, and a 3370 mdl B11 or B12 requires a 3370 mdl A11 or A12.

For a 4331 Processor Mdl Group 1 -- a 3370 mdl A1 requires a DASD Adapter (#3201) on the 4331.

For a 4331 Processor Mdl Group 2 or 4361 Processor -- a 3370 mdl A1/A2 requires a DASD Adapter (#3201 or #3202) on the 4331 or 4361, or a 3880 Storage Control mdl 1, 2 or 4 attached to the High-Speed Block Multiplexer Channel (#143X) on the 4331 or 4361.

For a 4331 Processor Mdl Group 11 -- a 3370 mdl A1/A2 attaches via a DASD Adapter which is standard on the 4331 Mdl Group 11.

For a 4361 -- a 3370 mdl A1 or A2 requires a DASD/8809 Adapter on the 4361, or a 3880 Storage Control mdl 1, 2 or 4 attached to a High-Speed Block Multiplexer Channel on the 4361.

For a 4341 or 4381 Processor -- a 3370 mdl A1 or A2 requires a 3880 Storage Control mdl 1, 2 or 4 connected to a 2.0 megabyte block multiplexer channel on the 4341 or 4381.

For a System/38 -- a 3370 mdl A11 or A12 requires attachment feature #1130 on the 5381 System Unit (mdls 4, 5, 6, 7, and 8), and a second 3370 mdl A11 or A12 on the 5381 System Unit mdl 8 requires attachment feature #1132. A specify code is also required on the 5381 System Unit to designate the 3370 units to be attached. For a 9375 or 9377 the 3370 model A1 or A2 requires a 3880 Storage Control model 1, 2 or 4. See M9370 pages.

A cable order is required for each A mdl ordered.

### HIGHLIGHTS

The 3370 features high data rate, fast access, fixed block format, and low cost per byte. It employs a fixed, sealed Head/Disk Assembly (HDA) as the storage medium. The HDA is a field replaceable unit. Two access arms per spindle, each separately addressable with overlapped operation -- locate-locate/read/write. Each arm accesses one-half the data. Reduced power and space requirements. Fixed block architecture allows the specification of DASD space in groups of blocks, making space definition independent of tracks and cylinders.

	Mdl Series	
Fixed Block Format	01/11	02/12
Data bytes per block	512	512
Blocks per actuator	558,000	712,752
Megabytes per actuator	285.6	364.9
Megabytes per spindle	571.3	729.8

Blocks are separately addressable and jointly form a contiguous address space.

	Mdl Series	
Performance Factors	01/11	02/12
Ave. Seek (arm motion)	20ms	19ms
Latency	10.1ms	10.1ms
Data Rate (+ or - 3%)	1.859MB/sec.	1.859MB/sec.

**Error Correction:** Error detection codes correct error bursts occurring in nine bits or less, and detect errors that span three bytes or less.

**Automatic Position Sensing:** Fixed Block Architecture provides for relative block addressing, each block separately addressable. When attached to the 4331, 4341, 4361, or 4381 Processor, the channel automatically disconnects during period of rotational latency providing greater channel availability. Requires one unshared subchannel on a 4331, 4341, 4361 or 4381 block multiplexer channel for each logical address.

**Command Retry:** (Not available with the System/38) Enables the storage control to recover from certain subsystem errors without recourse to system error recovery procedures.

**Write Project Function:** A switch is provided for each Drive Address to select a Write Protect function. On the 3370 mdls A01, B01, A02, B02, this function provides the means to protect data from being rewritten or erased. When the read/write switch is in the read-only position, any write command is rejected. The switch state can be changed only when the device is not selected. On the 3370 mdls

## MACHINES

A11, B11, A12, B12 (System/38), when a write operation is called for with the switch in the read-only position, the 3370 Direct Access Storage system will halt with an operator prompt to return the switch to its read/write position.

**HDA Data Recovery:** (Plant only) Should data in the field prove unrecoverable, data recovery assistance at the plant of manufacture will be provided. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

**Bibliography:** GA26-1657.

- **Color:** The color for the base enclosure is pearl white. For accent panel color (mdls A1, A2, A11 and A12) specify #9060 willow green, #9061 garnet rose, 9062 sunrise yellow, 9063 classic blue, #9064 charcoal brown, #9065 pebble gray, #9066 pearl white.

- **Machine Nomenclature:**

Canadian	Japanese	#2930
English	#2934	Portuguese
Canadian		(Brazil) #2933
French	#2935	Spanish
English US	#2924	

## SPECIFY.

Unless indicated otherwise, these specify features are only available at time of manufacture.

- **System Attachment:** If 3370-A2 is to be plant-merged with a 3090 Processor, specify #9491.

- **Power (AC, 3-phase):**

50 Hz 5-wire	60 Hz 4-wire
#2807 200V	#2733 200V
#2815 220V	#9903 208V
#2816 380V	#2800 220V
#2825 400V	#9915 240V**
#2826 415V*	

\* For System/38 5381 System Unit with 235V or 408V, specify #2826.

\*\* For System/38 5381 System Unit with 230V, specify #9915.

## SPECIAL FEATURES

- | **String Switch (#8150):** (Mdl A1, A2) To attach the 3370 to a second Storage Director or DASD Adapter. The two Storage Directors may be on the same processor or different processors. Switching between the two Storage Directors or DASD Adapter is under program control. The 3370 may also be dedicated to a single attachment with an enable/disable switch. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS

- | Model conversions are offered through RQs.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3375 DIRECT ACCESS STORAGE

### PURPOSE

High-speed, large-capacity, direct access disk storage for attachment to a 145, 148, 155-II, 158, 165-II, 168 or 3031, 3032, 3033, 3042 Attached Processor Model 2, 3081, 3083, 3084, 3090, 4341, 4331 Mdl Group 2, 4361, 4381, 9375, 9377 Processor.

### MODELS

**Model A1:** A disk storage unit with one head and disk assembly (HDA), two actuators and associated control for attachment to a 3880 Storage Control model 1 or 2. It provides logic and power for attachment of up to three 3375 3375 model B1 units.

**Model B1:** A disk storage unit with one HDA and two actuators. Up to three 3375 mdl B1s can be attached to a 3375 mdl A1.

**Model D1:** A disk storage unit with one HDA, two actuators, and associated control. In a 3375 string, the model D1 provides a dual controller function with a second data path to each HDA. It may be attached to the same system as the model A1, or to a different system. A 3375 string containing a model D1 requires model A1 and two B1 units.

**Limitations:** 3375 units may attach only to 3880 Storage Control mdls 1, 2, or 4. For systems attachment, see M3031, 3032, 3033, 3081, 3083, 3084, 4300, 9370 pages.

The mdl A1 and mdl D1 in the same string cannot be attached to the same storage director on the 3880, nor through the same channel on the processor.

**Maximum:** Up to three 3375 mdl B1 storage units may be attached to one 3375 mdl A1. In a dual controller string, two mdl B1 storage units and one 3375 mdl D1 storage unit may be attached to one mdl A1. Up to four mdl A1 or mdl D1 storage units may be attached to a 3880 storage director for a maximum of 32 addresses (actuators).

**Prerequisites:** A 3375 mdl A1 is required to attach 3375 mdl B1s. A 3880 Storage Control mdl 1, 2, or 4 required to attach a 3375 to a processor. Attachment of 3880 to a 4341, 4331 Mdl Group 2, 4361 or 4381 processor requires a block multiplexer channel with a data rate of at least 1.86MB. Attachment to 3031, 3032 or 3033 Processors or to a 3042 Attached Processor mdl 2 requires Data Streaming (#4850) installed on processor channel groups or Speed Matching Buffer feature (#6560) installed on the 3880. Attachment to a 3081, 3083, 3084 or 3090 processor is via any block multiplexer channel. Attachment to 145, 148, 155-II, 158, 165-II or 168 Processors require a Speed Matching Buffer (#6560) installed on the 3880. The Speed Matching Buffer feature (#6560) is not supported for attachment to a 3090 Processor. Attachment to 9375 or 9377 requires (#6003). See M9370 pages.

A 3375 string containing a mdl D1 requires a mdl A1 and two mdl B1s. Each mdl A1 and B1 must have a mdl D1 attachment feature installed.

**Write Protect Function:** A switch for each drive address provides the means to protect data from being rewritten or erased. When the read/write switches in the read-only position, any write command is rejected. The switch state can be changed only when the device is not selected.

### HIGHLIGHTS

The 3375 features high data rate, fast access and low cost per byte of storage. Each 3375 unit contains one 819.7MB sealed and permanently mounted head and disk assembly. There are two actuators per HDA, each is separately addressable and accesses one-half of the HDA storage (409.8MB). Each seeking and rotational position sensing of any actuator can be overlapped with seeking, rotational position sensing, and data transfer of the other actuators.

With a mdl D1 installed, a data transfer operation from an actuator in any unit in the string may be overlapped with another data transfer operation from an actuator in any other unit in the string.

### Characteristics:

General -			
Actuators per HDA	2		
HDAs per unit	1		
Capacity -			
per actuator	409.8	MB	
per HDA	819.7	MB	
per max string	3.27	GB	
Access Time -			
Average seek (actuator motion)	19	ms	
Average latency	10.1	ms	
Data Rate -	1.859	MB/sec.	

### Data Format: Count-key-data.

- Error Correction: Capability is provided to correct as well as detect single data error bursts of up to sixteen bits if the burst spans no more than two contiguous bytes.

- Rotational Position Sensing: Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential -- requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

- Head and Disk Assembly Data Recovery (plant only): Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. Branch Office Customer Engineering will initiate the recovery procedure. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning the head and disk assembly to the plant for data recovery.

- Flag Free: The 3375 will be shipped Flag Free.

**Publications:** GC20-0001

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Power (AC, 3-phase):

50 Hz (5-wire)	60 Hz (4-wire)
200V #2807	200V #2733
220V #2815	208V #9903
230V #2827	220V #2800
240V #2818	240V #9915
380V #2816	
400V #2825	
415V #2826	

- Color: (Mdl A1) #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

### SPECIAL FEATURES

**Mdl D1 Attachment For Mdl A1 (#4951):** This feature must be included on all mdl A1 boxes that are installed in a string that includes a mdl D1. Field installation: Yes.

## MACHINES

**Note:** A mdl A1 with this feature installed will not operate in a string without a mdl D1.

**Mdl D1 Attachment Feature For Mdl B1 (#4952):** This feature must be included on all mdl B1 boxes that are installed in a string that includes a mdl D1. Field Installation: Yes.

**Note:** A mdl B1 with this feature installed will not operate in a string without a mdl D1.

**String Switch (#8150):** (Mdl A1, D1) For use with 3880 Storage Controls mdls 1, 2 or 4 only. #8150 is used to attach the 3375 mdl A1 or mdl D1 to a second storage director. The two storage directors may be on the same processor or different processors. Switching between the two storage directors is under program control. The 3375 may also be dedicated to a single attachment through

enable/disable switches. Maximum: One each on mdl A1 and mdl D1. Field Installation: Yes.

## MODEL CONVERSIONS

Model changes between models A1 and B1 or between models A1 and D1 are available at time of manufacture only. A model change from a B1 to a D1 is permitted in the field. A model change from a D1 to a B1 is not recommended for field installation.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3380 DIRECT ACCESS STORAGE

**THERE IS MORE THAN ONE TEXT VERSION FOR THIS PRODUCT**

### PURPOSE

High-speed, large-capacity, direct access disk storage for attachment to 4341, 4361, 4381, 3031, 3032, 3033, 3081, 3083, 3084, 3090, 9375, 9377 Processors, 3042 Attached Processor Model 2. The 3380 Models A04, AA4 and B04 also attach to S/370 Models 158, 158-3, 168, and 168-3.

### MODELS

**Model A4 A04 (NO LONGER AVAILABLE):** A disk storage unit with two head and disk assemblies (HDAs), four actuators and associated control for attachment to a 3880 Model 2 or 3 storage director. It provides logic and power for attachment of up to three 3380 Model B04 units. The maximum storage capacity is 2.52 billion bytes.

**Model AA4 AA4 (NO LONGER AVAILABLE):** A disk storage unit with two HDAs, four actuators and associated controls for attachment to two 3880 Model 2, 3, 13 or 23 storage directors, or two 3990 Model 1, 2, or 3 storage paths. Model AA4/B04 actuators are arranged on multiple internal paths within a string, with up to four actuators sharing a path. Dynamic path selection controls access to the actuators. It provides access by both storage directors to all actuators in a Model AA4/B04 string and enables concurrent data transfer operations, via each storage director, to actuators not sharing an internal data path. The logic and power are provided for attachment of up to three 3380 Model B04 units. The maximum storage capacity of this Model is 2.52 billion bytes.

**Model B4 B04 (NO LONGER AVAILABLE):** A disk storage unit with two HDAs and four actuators. Up to three 3380 Model B04s can be attached to a 3380 Model A04 or AA4. The maximum storage capacity of this model is 2.52 billion bytes.

**Model AD4 AD4:** A disk unit with two HDAs, four actuators and associated controls for attachment to two 3990 Model 1, 2, or 3 storage paths or two 3880 Model 3 or 23 storage directors. Device Level Selection (DLS) permits concurrent data transfer from any two actuators within the unit or associated string including those of the same HDA. Logic and power are provided for attachment of up to three 3380 Model BD4/BE4 units intermixed in any sequence or combination. The maximum storage capacity of the Model AD4 is 2.52 billion bytes. The Model AD4 can be upgraded in the field to a Model AE4.

**Model BD4 BD4:** A disk unit with two HDAs and four actuators. The Model BD4 can be connected to either an AD4, an AE4, a BE4 or another BD4. The maximum storage capacity of the Model BD4 is 2.52 billion bytes. The Model BD4 can be upgraded in the field to a Model BE4.

**Model AE4 AE4:** A disk unit with two HDAs, four actuators and associated controls for attachment to two 3990 Model 1, 2, or 3 storage paths or two 3880 Model 3 or 23 storage directors. Device Level Selection (DLS) permits concurrent data transfer from any two actuators within the unit or associated string including those of the same HDA. Logic and power are provided for attachment of up to three 3380 Model BE4/BD4 units intermixed in any sequence or combination. The maximum storage capacity of the Model AE4 is 5.04 billion bytes.

**Model BE4 BE4:** A disk unit with two HDAs and four actuators. The Model BE4 can be connected to either an AE4, an AD4, a BD4 or another BE4. The maximum storage capacity of the Model BE4 is 5.04 billion bytes.

**Model AJ4:** A disk storage unit with two HDAs, four actuators and associated controls for attachment to two 3990 Model 1, 2, or 3 stor-

age paths, or two 3880 Model 3 or 23 storage directors. The maximum storage capacity of the Model AJ4 is 2.52 billion bytes. The Model AJ4 can be upgraded in the field to a Model AK4.

Two interconnected 3380 Model AJ4s, or AK4s, or one AJ4 and one AK4, attach to a 3990 Model 2 or 3 in Device Level Selection Enhanced (DLSE) mode with feature #9433 on each A-unit. DLSE permits concurrent data transfer from any FOUR actuators within the unit or associated string, including those of the same HDA. Logic and power are provided for attachment of up to six 3380 Model BJ4/BK4 units intermixed in any sequence or combination, where three B-units are attached to each A-unit in the string.

The 3380 Model AJ4, with feature #9432, attaches to 3990 Model 1, 2, or 3 in Device Level Selection (DLS) mode. DLS permits concurrent data transfer from any TWO actuators within the unit or associated string, including those of the same HDA. Logic and power are provided for attachment of up to three 3380 Model BJ4/BK4 units intermixed in any sequence or combination. The Model AJ4, with feature #9431, attaches to two 3880 Model 3 or 23 storage directors with feature #3005 on the Model 3, or feature #3010 on the Model 23. Logic and power are provided for attachment of up to three 3380 Model BJ4/BK4 units intermixed in any sequence or combination.

**Model BJ4:** A disk storage unit with two HDAs and four actuators. The Model BJ4 can be connected to either an AJ4, an AK4, a CJ2, a BK4, or another BJ4. The maximum storage capacity of the Model BJ4 is 2.52 billion bytes. The Model BJ4 can be upgraded in the field to a Model BK4.

**Model AK4:** A disk storage unit with two HDAs, four actuators and associated controls for attachment to two 3990 Model 1, 2, or 3 storage paths, or two 3880 Model 3 or 23 storage directors. The maximum storage capacity of the Model AK4 is 7.56 billion bytes.

Two interconnected 3380 Model AK4s, or AJ4s, or one AK4 and one AJ4, attach to a 3990 Model 2 or 3 in Device Level Selection Enhanced (DLSE) mode with feature #9433 on each A-unit. DLSE permits concurrent data transfer from any FOUR actuators within the unit or associated string, including those of the same HDA. Logic and power are provided for attachment of up to six 3380 Model BK4/BJ4 units intermixed in any sequence or combination, where three B-units are attached to each A-unit in the string.

The 3380 Model AK4, with feature #9432, attaches to 3990 Model 1, 2, or 3 in Device Level Selection (DLS) mode. DLS permits concurrent data transfer from any TWO actuators within the unit or associated string, including those of the same HDA. Logic and power are provided for attachment of up to three 3380 Model BK4/BJ4 units intermixed in any sequence or combination. The Model AK4, with feature #9431, attaches to a 3880 Model 3 or 23 with feature #3005 on the 3880 Model 3, or feature #3010 on the 3880 Model 23. Logic and power are provided for attachment of up to three 3380 Model BK4/BJ4 units intermixed in any sequence or combination.

**Model BK4:** A disk storage unit with two HDAs and four actuators. The Model BK4 can be connected to either an AK4, an AJ4, a CJ2, a BJ4 or another BK4. The maximum storage capacity of the Model BK4 is 7.56 billion bytes.

### Prerequisites:

**Models A04, AA4, B04:** A 3380 Model A04 requires a 3880 Storage Control Model 2 or 3 to attach to a block multiplexer channel; a 3380 Model A04 requires one storage director in a 3880 Model 2 or 3.

A 3880 Storage Control Model 2, 3, 13, or 23 or a 3990 Storage Control Model 1, 2, or 3 is required to attach a 3380 Model AA4 to a block multiplexer channel. A 3380 Model AA4 requires two storage paths within the same 3990 Model 1, 2, or 3, or within dual-framed 3990 Model 2s or 3s, or two storage directors that can be within the same or different 3880 Model 2s or 3s. When attached to a 3880 Model 13 or 23, see other limitations described in the M3880 pages. To obtain updated installation and maintenance information for attaching a Model AA4 to a 3990, feature #9003 is required on the 3990.

**Models AD4, BD4, AE4, BE4:** A 3990 Model 1, 2, or 3 Storage Control or a 3880 Model 3 or 23 Storage Control is required to attach a 3380 Model AD4 or AE4 to a block multiplexer channel. A 3380 Model AD4 or AE4 requires two storage paths within the same 3990 Model 1, 2, or 3 or within dual-framed 3990 Model 2s or 3s, or two storage directors that can be within the same or different 3880 Model 3s or 23s. When attached to a 3880 Model 3 or 23, see limitations as described in the M3880 pages.

3990 Models 1, 2, and 3 are equipped to attach 3380 Models AD4 and AE4; feature #9052 (updated maintenance and installation information) is required on the 3380 Model AD4 or AE4.

**Models AJ4, BJ4, AK4, BK4:** A 3990 Model 1, 2, or 3 Storage Control or a 3880 Model 3 or 23 Storage Control is required to attach a 3380 Model AJ4 or AK4 to a block multiplexer channel. A 3380 Model AJ4 or AK4 requires two storage paths within the same 3990 Model 1, 2, or 3 in DLS support mode with feature #9432 on the 3380 AJ4 or AK4 (2-path strings). Two 3380 Model AJ4s, AK4s, or an AJ4 and an AK4 can be interconnected to share four storage paths within the same 3990 Model 2 or 3 in DLSE support mode with feature #9433 on each of the two A-units (4-path strings).

A 3380 Model AJ4 or AK4 requires two storage directors that can be within the same or different 3880 Model 3s or 23s. Attachment of 3380 Models AJ4 or AK4 to a 3880 Model 3 or 23 requires feature #9431 on the DASD, and feature #3005 and two #9050s on the 3880 Model 3, or feature #3010 and two #9055s on the 3880 Model 23. See other limitations as described in the M3880-3 and M3880-23 pages.

For all models, see limitations and processor attachment sections of these sales pages.

**Maximum:** 3380 string length varies depending on the models and the storage control to which the string is attached. A 3380 Model A04, AA4, AD4 or AE4 string is always comprised of one A-unit and zero to three B-units. A 3380 Model AJ4 or AK4 2-path string is comprised of one A-unit and zero to three Model BJ4 and/or BK4 units. A 3380 Model AJ4 or AK4 4-path string is comprised of two Model AJ4 and/or AK4 units in any combination and zero to six Model BJ4 and/or BK4 units in any combination, and requires attachment to a 3990 Model 2 or 3 in DLSE support mode.

Two 3380 Model AA4, AD4, AE4, AJ4 or AK4 2-path strings, in any combination, can be attached to one 3880 or one 3990 Model 1 Storage Control, allowing up to eight 3380 units per storage control. A 3990 Model 2 or 3 can attach up to four 3380 Model AA4, AD4, AE4, AJ4, or AK4 2-path strings in any combination, or up to two AA4, AD4 or AE4 strings and one 4-path AJ4 and/or AK4 string, or up to two 4-path AJ4 and/or AK4 strings, allowing up to 16 3380 units per storage control.

Strings headed by 3380 Models AA4, AD4 and AE4 can be paired in any combination on a 3880. Strings headed by Models AD4, AE4, AJ4 and AK4 can be paired in any combination on a 3880 Model 3 or 23. Strings headed by Models AA4, AD4, AE4, AJ4 and AK4 can be paired in any combination on a 3990 Model 1, 2, or 3.

## Limitations

### 1. B-Unit Attachment:

- A string headed by either a Model A04 or a Model AA4 can only attach Model B04 units.
- A string headed by either a Model AD4 or AE4 can only attach either Model BD4 and/or Model BE4 units.
- A string headed by either a Model AJ4 or AK4 can only attach either Model BJ4 and/or Model BK4 units.

### 2. Pairing Strings:

- A Model AJ4 or AK4 2-path string attached to a 3990 Model 2 or 3 cannot be paired with a Model AJ4/AK4 4-path string.

### 3. Storage Control Attachment:

- Model A04 cannot be attached to the same storage directors as the Models AA4, AD4, AE4, AJ4 and AK4.
- A Model AA4 with serial numbers 97-00001 through 97-00686 cannot attach to a 3990.

- The Speed Matching Buffer feature (#6550) on the 3880 cannot be used with the 3380 Models AD4, BD4, AE4, BE4, AJ4, BJ4, AK4, and BK4.
- The Speed Matching Buffer feature (#6550) on the 3880 is not supported for attachment to a 3090 Processor.
- A 3380 Model A04 or AA4 cannot attach to a 3880 Model 3 which has feature #3005 (3380 AJ4/AK4 Support) or to a 3880 Model 23 which has feature #3010 (3380 AJ4/AK4 Support).
- If a 3880 Model 3 with feature #3005 is cross-connected to another 3880 Model 3, then both 3880s must have feature #3005 installed.
- If a 3880 Model 23 with feature #3010 is cross-connected to another 3880 Model 23, then both 3880s must have feature #3010 installed.

### 4. Specify Features:

- Attachment of 3380 Models AD4 and AE4 to a 3880 Model 3 requires feature #8173 (AD4/AE4 Support) and two #9208 (Extended Specify) features on the 3880, except when feature #3005 is installed.
- Feature #8173 (AD4/AE4 Support) cannot be installed on 3880 Model 3s concurrent with the Speed Matching Buffer for 3880 feature (#6550).
- See table below for 3880 Model 3 serial number limitations for feature #8173.
- All 3880 Model 23s are equipped to attach 3380 Models AD4 and AE4.
- Attachment of 3380 Models AJ4 and AK4 to a 3880 Model 3 requires feature #3005 (3380 AJ4/AK4 Support) and two #9050 features on the 3880.
- 3880 Model 3s with feature #8173 (AD4/AE4 Support) or feature #6550 (Speed Matching Buffer) must have those features removed before feature #3005 can be installed.
- Attachment of 3380 Models AJ4 and AK4 to a 3880 Model 23 requires feature #3010 (3380 AJ4/AK4 Support) and two #9055 features on the 3880.
- See table below for 3880 Model 3 serial number limitations for feature #3005.
- Feature #3010 (3380 AJ4/AK4 Support) cannot be installed on 3880 Model 23s that have the Record Cache RPQ #8B0035.

Table - 3380 Model 3 Serial Number Limitations for Attachment of 3380 Models AD4, AE4, AJ4, and AK4:

CANNOT ADD	CAN ADD #8173
#8173 OR	OR #3005 IF
#3005	HAVE RPQ MM2865

970XXXX

CAN ADD #8173	HAS #8173;
OR #3005	CAN ADD #3005
	IF #8173 REMOVED

9750000-9759999  
9770000-9779999

978XXXX-

## HIGHLIGHTS

The 3380 features high data rate, fast access and low cost per byte of storage. Each 3380 unit contains two permanently mounted head and disk assemblies (HDAs). There are two actuators per HDA -- each accessing one-half of the HDA storage and each separately addressable. Seeking and rotational position sensing of any actuator can be overlapped with seeking, rotational position sensing, and data transfer of the other actuators.

Model AA4, AD4, AE4, AJ4, and AK4 enable attachment of a 3380 string to a second storage director with dynamic path selection controlling access to the actuators, providing access via both storage directors to all data and storage control status in a string. In strings headed by either Models AD4, AE4, AJ4, or AK4 the efficiency of data access is improved by the function of Device Level Selection (DLS), allowing any two actuators in the string to read or

write data simultaneously. Four-path string capability is introduced with the Device Level Selection Enhanced (DLSE) function of the Models AJ4, BJ4, AK4, and BK4, which extends the efficiency of data access by allowing any four actuators in the string to read or write data simultaneously.

## CHARACTERISTICS:

	Model	Model	Model	Model	Model
	-----	-----	-----	-----	-----
	A04 AA4, B04	AD4, BD4	AE4, BE4	AJ4, BJ4	AK4, BK4
General Actuators per HDA	2	2	2	2	2
HDAs per unit	2	2	2	2	2
Capacities per actuator	630Mb	630Mb	1.26Gb	630Mb	1.89Gb
per HDA	1.26Gb	1.26Gb	2.52Gb	1.26Gb	3.78Gb
per unit	2.52Gb	2.52Gb	5.04Gb	2.52Gb	7.56Gb
per max 2-path string	10.08Gb	10.08Gb	20.16Gb	10.08Gb	30.24Gb
per max 4-path string	-	-	-	20.16Gb	60.48Gb
Access Times Average seek (actuator motion)	16ms	15ms	17ms	12ms	16ms
Average latency	8.3ms	8.3ms	8.3ms	8.3ms	8.3ms
Data Rate (Mb/sec.)	3.0	3.0	3.0	3.0	3.0

## PROCESSOR ATTACHMENT

Processor	Storage Control*	3380*
-----	-----	-----
S/370 Model 158, 158-3, 168, 168-3, on 1.5 Mb/sec. block multiplexer channel	3880-2, 3, w/#6550	A04 or AA4
3031, 3032, 3033, 3042 Model 2, w/o feature #4850, on 1.5 Mb/sec. block multiplexer channel	3880-2, 3, w/#6550	A04 or AA4
3031, 3032, 3033, 3042 Model 2, with #4850; 3081, 3083, 3084, 3090 via any block multiplexer channel supporting channel rates of 3.0Mb/sec. or greater	3880-2, 3 3880-2, 3, 13, 23 3880-3 w/#8173, #9208 (2) 3880-23 3880-3 w/#3005, #9050 (2) 3880-23 w/#3010, #9055 (2)	A04 AA4 AA4, AD4, AE4 AA4, AD4, AE4 AD4, AE4; AJ4, AK4 w/#9431 AD4, AE4; AJ4, AK4 w/#9431
3081, 3083, 3084, 3090, 4381, 9375, 9377, via any block multiplexer channel supporting channel rates of 3.0 Mb/sec. or greater	3990-1, 2, 3, w/#9003 3990-1, 2, 3 3990-1	AA4 AD4, AE4, w/#9052 AJ4, AK4, w/#9432

	3990-2, 3	AJ4, AK4, w/#9432 or #9433
4341 on 2.0 Mb/sec. block multiplexer channel	3880-2, 3 w/#6550	A04 or AA4
4341, 4361, 4381, on 3.0 Mb/sec. block multiplexer channel	3880-2, 3 3880-2, 3, 13, 23	A04 AA4
	3880-3 w/#8173, #9208 (2) 3880-23 3880-3 w/#3005, #9050 (2) 3880-23 w/#3010 #9055 (2) 3880-2, 3, w/#6550	AA4, AD4, AE4 AA4, AD4, AE4 AD4, AE4; AJ4, AK4, w/#9431 AD4, AE4; AJ4, AK4, w/#9431 A04 or AA4
4381 on 3.0 Mb/sec. block multiplexer channel in shared DASD environments		
9375, 9377 on 3.0 Mb/sec. block multiplexer channel w/#6003	3880-3 3880-3, 23	A04 AA4
	3880-3 w/#8173, #9208 (2) 3880-23 3880-3 w/#3005, #9050 (2) 3880-23 w/#3010, #9055 (2)	AA4, AD4, AE4 AA4, AD4, AE4 AD4, AE4; AJ4, AK4, w/#9431 AD4, AE4; AJ4, AK4, w/#9431
4381, 937X, 308X, 3090, via any block multiplexer channel supporting channel rates of 3.0 Mb/sec. or greater	3380 CJ2	BJ4, BK4

**Note:** See individual processor, M3880, M3990, and these sales pages for serial number limitations and additional information.

**Data Format:** Count-key-data provides format continuity with current IBM large systems direct access storage products.

**Dynamic Path Selection:** Incorporated in Models AA4, AD4, AE4, AJ4 and AK4 which attach to two 3880 storage directors. Dynamic path selection controls access to the actuators, providing paths via two controllers in the head of string from both storage directors to all actuators in a 3380 string. Introduced with the 3380 Model AA4, DPS allows concurrent data transfer operations to actuators on different internal data paths in a 3380 AA4 string. When Dynamic Path Selection is used with the 370-XA channel subsystem, the 3380 can dynamically reconnect to the first available channel path identified by the originating processor. This has the potential of increasing effective throughput and/or improving response time.

**Device Level Selection:** Device Level Selection (DLS), announced with the 3380 Models AD4, BD4, AE4, and BE4, enhanced the DPS functions by providing two independent data paths to each device in a 2-path string, including those of the same HDA. DLS is also available with the 3380 Models AJ4, BJ4, AK4, BK4, and CJ2. A 2-path string has a maximum of 16 device addresses (four DASD units), with the exception of a 3380 CJ2 string, which has a maximum of 14 device addresses.

**Device Level Selection Enhanced:** Device Level Selection Enhanced (DLSE), announced with the 3380 Models AJ4, BJ4, AK4, and BK4, improves upon the DLS functions by providing four independent data paths to each device in the 3380 4-path string. When two 3380 Models AJ4 and/or AK4 are attached to a 3990 Model 2 or 3 in DLSE support mode, each of the four controllers (provided by interconnecting the two A-units) has a path to all devices in the string, and any four devices in the 4-path string can read or write data simultaneously. A 4-path string has a maximum of 32 device addresses (eight DASD units).

**Error Correction:** Capability is provided to correct single data error bursts in 3380 Models A04, AA4, B04, AD4, BD4, AE4, and BE4, and multiple error bursts in 3380 Models AJ4, BJ4, AK4, and BK4.

**Rotational Position Sensing:** Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential. Requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

**Format Write Release:** Enables channel and storage director to disconnect while the remainder of a track is being erased following the end of a format written record.

**Separate Actuator Maintenance:** Enables the associated logic and controls of each actuator to be serviced independent of and concurrent with customer operation of the other actuators within the same HDA and string.

**Nondisruptive Install:** Allows installation of BJ4/BK4 units to an existing 4-path AJ4/AK4 string, as well as the installation of a second 4-path AJ4/AK4 string, without the loss of data availability to an existing string.

**Head and Disk Assembly Data Recovery:** (Plant only) Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning Head and Disk assembly to the plant for data recovery.

**Flag Free:** The 3380 will be shipped with all tracks flag free.

**Publications:** The following manuals are part of the Storage Subsystems Library (SSL).

## MACHINES

- GC26-4491 SSL: IBM 3380 Direct Access Storage Introduction
- GC26-4492 SSL: Using the IBM 3380 Direct Access Storage in an MVS Environment
- GC26-4493 SSL: Using the IBM 3380 Direct Access Storage in a VM Environment
- GC26-4494 SSL: Using the IBM 3380 Direct Access Storage in a VSE Environment
- GC26-4495 SSL: Maintaining IBM Storage Subsystem Media

- Tool Kit, required for CE maintenance. Contact the account Field Manager for requirements. (Except Canada > Specify #9750 for first 3380 Model A04, AA4, AD4, AE4, AJ4 or AK4 ordered for a customer. <)

## SPECIAL FEATURES (NONE)

## SPECIFY

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

- Machine Nomenclature: (A-Units only)

Brazilian/			
Portuguese	#2938	German	#2929
English	#2927	Japanese	#2930
French	#2928	Spanish	#2931

- 3380 Attachment

#9052 3380 AD4/AE4 updated installation/maintenance information for attachment to 3990 Storage Controls

#9431 3380 AJ4/AK4 support feature for attaching to a 3880 Model 3 or 23

#9432 3380 AJ4/AK4 2-path string attachment to a 3990 Storage Control

#9433 3380 AJ4/AK4 4-path string attachment to a 3990 Model 2 or 3 Storage Control

**Note:** 3380-AA4 attachment to 3990 requires feature #9003 (updated installation/maintenance information) to be ordered with a 3990. Refer to M3990 sales pages for details.

## MODEL CONVERSIONS

The model conversions shown below are field installable on purchased equipment on a purchase only basis.

Model A04 conversion to Model AA4

Model AD4 conversion to Model AE4

Model BD4 conversion to Model BE4

Model AJ4 conversion to Model AK4

Model BJ4 conversion to Model BK4

The attachment feature conversions shown below are field installable at no charge. For 3380 Models AJ4 and AK4 only:

Specify feature #9431 to #9432

Specify feature #9431 to #9433

Specify feature #9432 to #9433

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3380 DIRECT ACCESS STORAGE - MODEL CJ2

### PURPOSE

High-speed, large capacity, direct access disk storage with integrated storage controls for direct attachment to 4381, 3081, 3083, 3084, 3090, 9375 and 9377 Processors.

### MODEL

**Model CJ2:** A disk unit with one HDA with two actuators, and two storage control paths for direct attachment to 3Mb/sec. block multiplexer channels of the 4381, 3081, 3083, 3084, 3090, 9375 and 9377 processors. The storage capacity of the HDA is 1.26Gb. Logic and power are provided for attachment of up to three 3380 Model BJ4/BK4 units intermixed in any sequence or combination. The maximum CJ2 string capacity is 23.9 billion bytes of storage.

**Prerequisites:** The 3380 Model CJ2 requires a 3Mb/sec. block multiplexer channel for attachment of each of its two Storage Control paths to a supported processor. Attachment of both interfaces to two channels of the same processor assures data availability; attachment to one channel on each of two processors provides data sharing without storage path redundancy.

**Limitations:** Each channel interface of the two provided on the IBM 3380 Model CJ2 can be attached to only one 3Mb/sec. block multiplexer channel. When sharing a processor channel with other storage controls, the Model CJ2 must follow any storage control that is operating at rates greater than 3Mb/sec.

### HIGHLIGHTS

#### Characteristics

##### General

Actuators per HDA	2
HDAs per unit	1

##### Capacities

per actuator	630Mb
per HDA	1.26Gb
per unit	1.26Gb
per max string	23.9Gb

##### Access Times

Average seek (actuator motion)	12ms
Average latency	8.3ms
Data Rate (Mb/sec.)	3.0

**Processor Attachment:** The 3380 Model CJ2 attaches directly to 4381, 3081, 3083, 3084, 3090, 9375 and 9377 Processors via 3Mb/sec. block multiplexer channels.

**Data Format:** Count-key-data provides format continuity with current IBM large systems direct access storage products.

**Device Level Selection:** Device Level Selection (DLS), provides two independent data paths to each device in a 2-path string, including those of the same HDA, supporting concurrent data transfer over these two paths.

**Maximum:** A 3380 CJ2 string has a maximum of 14 device addresses.

**Error Correction:** Capability is provided to correct multiple data error bursts in the 3380 Model CJ2.

**Rotational Position Sensing:** Permits channel and storage director disconnect during period of rotational latency, thereby providing for improved channel utilization and system performance potential.

Requires one unshared subchannel on a block multiplexer channel for each logical device address (each actuator).

**Format Write Release:** Enables channel and storage director to disconnect while the remainder of a track is being erased following the end of a format written record.

**Separate Actuator Maintenance:** Enables the associated logic and controls of each actuator to be serviced independent of and concurrent with customer operation of the other actuators within the same HDA and string.

**Head and Disk Assembly Data Recovery:** (Plant only) Should data in the field prove unrecoverable, data recovery assistance will be provided at the plant of manufacture. The customer is required to provide a sufficient number of appropriate media (tapes, disk modules, etc.) to contain recovered data when returning Head and Disk Assembly to the plant for data recovery.

**Flag Free:** The 3380 Model CJ2 will be shipped with all tracks flag free.

**Publications:** The following publications will be available immediately. To order, contact your IBM representative.

- GC26-4491 SSL: IBM 3380 Direct Access Storage Introduction
- GC26-4497 SSL: IBM 3380 Direct Access Storage Direct Channel Attach Model CJ2 Introduction and Reference
- GC26-4492 SSL: Using the IBM 3380 Direct Access Storage in an MVS Environment
- GC26-4493 SSL: Using the IBM 3380 Direct Access Storage in a VM Environment
- GC26-4494 SSL: Using the IBM 3380 Direct Access Storage in a VSE Environment
- GC26-4495 SSL: Maintaining IBM Disk Storage Media
- GX26-1678 IBM 3380 Direct Access Storage Reference Summary

**Note:** All of the above publications may be ordered using one Bill of Forms (BOF) number, GbOF-1762.

The following publications will be available at software general availability:

- GC24-5371 VM IBM 3380 Direct Access Storage Models AJ4/BJ4 and AK4/BK4
- GC24-5372 VM IBM 3990 Storage Control Models 1 and 2 and IBM 3380 Direct Access Storage Direct Channel Attach Model CJ2

Additional manuals relating to physical planning include:

- GC22-7064 IBM Input/Output Equipment Installation Manual
- GC22-7069 IBM Input/Output Equipment Reference Installation

SLSS is available by product number and subject code. Customers currently subscribing to SLSS will receive publication updates automatically.

### SPECIFY

#### Power (AC, 3-phase)

50 Hz	60 Hz	50 Hz
5-wire	4-wire	4-wire (Japan)
200V #2807	200V #2733	200V #2907
220V #2815	208V #9903	220V #2915
230V #2827	220V #2800	240V #2918
240V #2818	240V #9915	
380V #2816		
400V #2825		
415V #2826		

**Note:** Voltage changes, Plant or Field, cannot be made between any of the above columns.

**Tool Kit:** Required for CE maintenance. Contact the account Field Manager for requirements.

**Color:** #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

(Except Canada > Specify #9750 for first 3380 Model CJ2. <)

**Machine Nomenclature: (C-Units only)**

Brazilian/ Portuguese	#2938	German	#2929
English	#2927	Japanese	#2930
French	#2928	Spanish	#2931

**SPECIAL FEATURES (NONE)**

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 3410 MAGNETIC TAPE UNIT 3411 MAGNETIC TAPE UNIT and CONTROL

### PURPOSE

Magnetic tape units and controls for a System/3 models 8/10/12/15, System/38 or 3790 Communication System, S/370 models 115 through 158, a 3031 Processor, or a 4331, 4341 or 4361 Processor ... the 3410 model 1 can be used with a 3881 Optical Mark Reader model 2 or a 3886 Optical Character Reader model 2 ... the 3411 and 3410 model 3s can be used with a 3800 Printing Subsystem ... the 3411 model 1 can be used with a 3776 Communication Terminal model 3 or 4, or a 3777 Communication Terminal model 3 or 4.

### MODELS

<b>Model 1</b>	001	20,000 8-bit bytes per second (1600 bpi)
<b>Model 2</b>	002	40,000 8-bit bytes per second (1600 bpi)
<b>Model 3</b>	003	80,000 8-bit bytes per second (1600 bpi)

**Maximums:** Interconnected 3410s and 3411s must be of the same mdl ... mdls cannot be intermixed. The maximum number of tape units (3410s) per 3411 are:

- Mdl 1 - up to three 3410 mdl 1s ... a total of 4 drives.\*
- Mdl 2 - up to five 3410 mdl 2s ... a total of 6 drives.\*
- Mdl 3 - up to five 3410 mdl 3s ... a total of 6 drives.\*

\* For System/3 mdls 8/10/12/15 or S/38: Maximums for mdls 2 and 3 are the same as mdl1.

**Limitations:** A maximum of one 3410 mdl 1 can be attached to a 3881 or 3886; no 3411 is required. A maximum of 4 tape drives (any mdl) can be attached to a System/3 mdl 8/10/12/15 or System/38.

**Prerequisites:** Each 3411 requires the following:

**For System/3 mdl 10/15:** A 3411 Magnetic Tape attachment (#7951) on the 5410 or 5415 and System/3 mdl 8/10/12/15, System/38 Attachment (#7003) on the 3411... see "Special Features".

**For System/3 mdl 8:** A 3411 Magnetic Tape Attachment (#7960) on the 5408 and System/3 mdl 8/10/12/15, System/38 Attachment (#7003) on the 3411... see "Special Features".

**For System/3 mdl 12:** A Basic Attachment Feature (#4701) and a 3411 Magnetic Tape Attachment (#7960) on the 5412 and System/3 mdl 8/10/12/15, System/38 attachment (#7003) on the 3411 ... see "Special Features".

**For System/38:** A 3411 Magnetic Tape Adapter (#7960) on the System/38 and System/3 mdl 8/10/12/15, System/38 attachment (#7003) on the 3411 ... see "Special Features". Each 3410 requires and appropriate model of the 3411, except when a 3410 mdl 1 is attached to a 3881 or 3886.

**For S/370 mdl 115, 125:** A 3411 Magnetic Tape Adapter (#4675) on the 3115 or 3125 and S/370 mdl 115/125 Attachment (#7361) on the 3411 except with 3115 mdl HG2, 3125 mdl HG2 and I2. When attached to 3115 mdl HG2, or 3125 mdl HG2 or I2, RPQ 870061 is required on the 3411 ... see "Special Features".

**For S/370 mdl 135 and up, and all 4300 processors:** A control unit position on a system channel, plus S/370 Attachment (#7360) on the 3411 ... see "Special Features".

**S/370 mdl 135:** Multiplexer channel (standard), selector or block multiplexer channels (special features) ... see M3135 pages. *NOT* supported on byte multiplexer channel for concurrent operation with Integrated File Adapter, Integrated Communications Adapter or Selector Channel.

**S/370 mdl 135-3:** Byte multiplexer channel (standard), block multiplexer channels (special features) ... see M3135-3 pages. *NOT* supported on byte multiplexer channel for concurrent operation of Integrated File Adapter, Integrated Communications Adapter or Block Multiplexer Channel.

**S/370 mdl 138:** Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages. *NOT* supported on byte multiplexer channel for concurrent operation of Integrated File Adapter, Integrated Communications Adapter, or Block Multiplexer Channel.

**S/370 mdl 145:** Multiplexer channel (standard), selector channels (one is standard), or block multiplexer channel (special feature) ... see M3145 pages.

**S/370 mdl 145-3:** Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.

**S/370 mdl 148:** Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3148 pages.

**S/370 mdl 155, 158:** Block multiplexer channel (first two are standard) ... see M3155, 3158 pages.

**3031 Processor:** Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031 pages.

**4300 Processors:** Byte multiplexer channel ... block multiplexer channel ... see M4331, 4341, 4361, 4381 pages.

**3776 Communication Terminal mdl 3 or 4, or 3777 Communication Terminal mdl 3 or 4:** 3411 Magnetic Tape Unit and Control mdl 1 Attachment feature (#7801) on the terminal ... see "Special Features" in M3776 or 3777 pages. The 3411 requires System/3-3770/3790 Communication System Attachment feature (#7003).

**3790 Communication System:** A Magnetic Tape Attachment feature (#7840) on the 3791 Controller. The 3411 requires a 3790 Attachment feature (#7003).

**3800 Printing Subsystem:** Tape-to-Printing Subsystem Feature (#7810) on the 3800 ... see "Special Features" in M3800 pages. **Note:** A control unit position is not required. 3410 and 3411 mdl 3s only may be attached. Up to eight tape control units may be attached provided that power sequencing and control connection for all other than one are provided by a system.

**3881 Optical Mark Reader:** A 3881 mdl 2. One 3410 mdl 1 only may be attached.

**3886 Optical Character Reader:** A 3886 mdl 2. One 3410 mdl 1 only may be attached.

**Magnetic Tape:** IBM Multi-System Tape (MST) or equivalent, is recommended for optimum performance. The minimum properties required for satisfactory performance are described in *Tape Requirements for One-Half Inch Tape Units*, GA32-0006-5.

### HIGHLIGHTS

The 3410 is a single tape unit controlled by a 3411. The 3411 is a single channel control unit with one tape drive.

- Efficient, compact, space-saving design.
- Dual Density feature ... allows processing of data recorded at 1600 bpi PE or 800 bpi NRZI.
- 7-Track feature ... tape written in 7-track format compatible with tapes written at 200, 556, 800 bpi by 729/7330/7335 and 2401/2402/2403/2404/2415/3420 tape drives equipped with 7-track read/write heads. **Note:** 7-track tapes cannot be read with a 3776 mdl 3 or 4, or a 3777 mdl 3.
- Radial attachment of tape unit permits limited off-line servicing.
- Simplified tape threading path.

**Checking:** During write operations, both parity and signal amplitude are checked. (When utilized with a 3881 Optical Mark Reader and the 3886 Optical Character Reader, both are checked in 800 bpi NRZI ... signal amplitude only in 1600 bpi.) During read operation, parity is checked.

**Error Correction:** In 1600 bpi PE recording format, single-track error correction in flight takes place. For 9-track 800 bpi NRZI, track in error (T.I.E.) is provided (not applicable when utilized with 3881 Optical Mark Reader and the 3886 Optical Character Reader).

**3410/11 (cont'd)**

**Functions:** The following table indicates feature numbers for corresponding functions:

Subsystem Function	Feature Name	3411 Control Unit	3410* Tape Unit (includes tape unit on 3411)
1600 bpi 9-track only	Single Density	Standard	#3211
1600 bpi PE/800 bpi NRZI 9-track	Dual Density	#9150	#3211 or #3221
1600 bpi PE/200-556-800 bpi NRZI 7-track	7-track	#9160**	#3211 or #6550

\* Tape units must all be same mdl as 3411.

\*\* Feature #9160 not available on System/38.

Characteristics	Mdl 1	Mdl 2	Mdl 3
Data rate (kb/sec)			
at 1600 bpi (PE)	20	40	80
at 800 bpi (NRZI)	10	20	40
at 556 bpi (7-track)	6.9	13.9	27.8
at 200 bpi (7-track)	2.5	5.0	10.0
Recording Density (bpi)	1600/800/556/200 (all mdls)		
Tape Speed (ips)	12.5	25	50
Nominal IBG (inch) -- 9-track	0.6	0.6	0.6
Nominal IBG (inch) -- 7-track	0.75	0.75	0.75
Nominal IBG Time (ms) -- 9-track	48	24	12
Nominal IBG Time (ms) -- 7-track	60	30	15
Nominal Rd/Wr Access Time (ms)	15	12	6
Rewind Time 2400 ft. Reel (min.)	3	3	2

**Publications:** S/370 -- GC20-0001, 3881 -- GA21-9127 and GA21-9143, System/3 -- GC20-8080, System/34 -- GC21-5754. Also, IBM 3410/3411 Component Summary, GA32-0015, GA32-0022.

**SPECIFY**

- Power: 200V AC or higher.

	50 Hz
Mdl 1	200V - #2806
(1-phase, 3-wire)	220V - #2813
	235V - #2814
Mdls 2 and 3	200V - #2807
(3-phase, 5-wire)	220V - #2815
	235V - #2818
	380V - #2816
	408V - #2819
	60 Hz
Mdls 1, 2 & 3	200V - #2732
(1-phase, 3-wire)	208V - #9902
	230V - #9904

For installation in Japan, specify power cable #2746 for 60 Hz, or #2747 for 50 Hz.

- Dual Density, Control (3411 only) - #9150: Permits attachment of 3410s equipped with Dual Density, Tape Unit (#3221) and installation of Dual Density, Tape Unit (#3221) on the 3411 itself. 3410s equipped with Single Density, Tape Unit (#3211) can also be attached. Limitations: Cannot be installed on same 3411 with #9160. Field Installation: Yes.
- 7-Track, Control (3411 only) - #9160: Permits attachment of 3410s equipped with 7-Track, Tape Unit (#6550) and installation of 7-Track, Tape Unit (#6550) on the 3411 itself. 3410s equipped with Single Density, Tape Unit (#3211) can also be attached. #9160 includes the translator function which, when used, causes 8-bit bytes from the I/O interface to be written on tape as 6-bit BCD characters and 6-bit characters read from tape to be translated into their EBCDIC equivalents. The Data Conversion function, also included, allows reading and writing of 8-bit bytes on 7-track tape by converting four tape characters to three storage bytes and vice versa. Limitations: Cannot be installed with #9150. Cannot be used with a 3776 mdl 3 or 4, or a 3777 mdl 3 or 4, not available on System/38. Field Installation: Yes.

- Additional Tape Units (3411 only) - #9001: Required if the number of tape drives is to exceed four (one 3411 plus three 3410s). Field Installation: Yes.

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.

- Language Groups:

English - #2927  
French - #2928  
German - #2929

Italian - #2932  
Japanese - #2930  
Spanish - #2931

- Density Formats: The 3410/3411 subsystem can operate in three density formats - 1600 bpi PE, single density ... or 1600/800 bpi, dual density ... or 200/556/800 bpi, 7-track. With the exception of single density, which is standard on the control unit of the 3411, a feature number for the format desired must be specified for each tape unit and the control unit ... see "Special Features" for limitations. Dual Density, Control (#9150) is required on the 3411 for Dual Density, Tape Unit (#3221) on the 3411 and attached 3410s ... see Specify #9150 above. 7-Track, Control (#9160) is required on the 3411 for 7-Track, Tape Unit (#6550) on the 3411 and attached 3410s ... see Specify #9160 above.

- System Attachments: #7003 is required on all System/3 mdls 8/10/12/15, and S/38 Attachment S/370 Mdl 115/125 (#7361) is required for attachment to a 3115 (except mdl HG2) or 3125 (except mdl HG2 and I2). When attached to 3115 mdl HG2, 3125 mdl HG2 or I2, RPQ 870061 is required on the 3411 ... see "Special Features". S/370 Attachment (#7360) is required for attachment to a S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155, 158, a 3031 Processor, or any 4300 processor, and for attachment to a 3800 mdl 3. System/3-3770/3790 Communication System Attachment (#7003) is required for attachment to a 3776 mdl 3 or 4, or a 3777 mdl 3, or a 3790 system.

Note: Not available without specifying one of the system attachments listed above.

**SPECIAL FEATURES**

**Single Density, Tape Unit (#3211):** [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 to operate at 1600 bpi PE only. Limitations: Cannot be installed with #3221 or #6550. Field Installation: Yes. Prerequisites: If installed on the 3886 Optical Character Reader, #6490 on the 3886.

**Dual Density, Tape Unit (#3221):** [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 mdl 1, 2, or 3 to operate at 800 bpi NRZI as well as 1600 bpi PE. Limitations: Cannot be installed with #3211 or #6550. Field Installation: Yes. Prerequisites: #9150 on the 3411 (see "Specify") or #3550 on the 3881 or #6485 on the 3886.

**7-Track, Tape Unit (#6550):** [3410, 3411 any mdl] Permits the 3410 or the tape unit on the 3411 to operate at 200, 556 or 800 bpi NRZI in the 7-track format compatible with 729, 7330, 7335 and 2401, 2402, 2403, 2404, 2415, 3420 tape units equipped with 7-track read/write heads. Tape units with this feature will only read or write 7-track tape. Limitations: Cannot be installed with #3211 or #3221, or on System/38. Cannot be used with a 3776 mdl 3 or 4 or a 3777 mdl 3. Field Installation: Yes. Prerequisites: #9160 (see "Specify") on the 3411.

**System/3 mdls 8/10/12/15/ and System/38 - 3770/3790 Communication System Attachment (#7003):** [3411 mdl 1, 2, 3] To attach a 3411 with up to three 3410s to a System/3 mdl 8, 10, 12, 15 or System/38, or to a 3791 Controller, or to attach one 3411 mdl 1 to a 3776 Communication Terminal mdl 3 or 4, or a 3777 Communication Terminal mdl 3 or 4. Prerequisites: 3411 (#7960) on 5408 and 5412, or 3411 (#7951) on the 5410 and 5415, or 3411 (#7960) on System/38, or #7801 on the 3776 mdl 3, or 4 or 3777 mdl 3. Maximum: One. Field Installation: Yes. Limitations: Cannot be installed with #7360 or #7361.

**S/370 - 3800 Attachment (#7360):** [3411 mdl 1, 2, 3] To attach the 3411 to a S/370 mdl 135, 135-3, 138, 145, 145-3, 148, 155, 158, a 3031 Processor, or any 4300 processor.

[3411 mdl 3] To attach the 3411 mdl 3 to a 3800 Printing Subsystem. Up to eight control units may be attached to the 3800 provided that power sequencing and control connection for all other than one are provided by the system. Limitations: Cannot be installed with #7003 or #7361 or RPQ 870061. Field Installation: Yes. Prerequisites: A control unit position on a system channel of the 3135, 3135-3, 3138, 3145, 3145-3, 3148, 3155 or 3158.

**MACHINES****3410/11 (cont'd)**

**S/370 Mdl 115/125 Attachment (#7361):** [3411 mdl 1, 2, 3] To attach the 3411 to a S/370 mdl 115 (except mdl HG2) or 125 (except mdl HG2 or I2). When attached to 3115 mdl HG2 or 3125 mdl HG2 or I2, RPO 870061 is required. **Limitations:** Cannot be installed with #7003, #7360 or RPO 870061. **Field Installation:** Yes. **Prerequisites:** #4675 on 3115 or 3125.

The Following Table Has Been Revised:

**TERMS and CONDITIONS**

Plan Offering: Plan A	Termination Charge Percent: 25%
Additional Use Charge Percent: 10%	Termination Charge Months: 5
Purchase Option: 55%	Metering: 3410, all mdls - I/O Unit on-line ... 3410 mdl 1 when used with a 3881 mdl 2 - I/O Unit off-line. 3411 assignable unit.
Machine Group: C	
Warranty: B	
Per Call: 3	

**MODEL CONVERSIONS** (None)

**ACCESSORIES** (None)

**SUPPLIES** (None)

## 3420 MAGNETIC TAPE UNIT MDLS 3, 5, 7

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

- Magnetic tape unit for S/360, S/370, 3090, 4300 and 9370 Processors.

### MODELS 3, 5, 7

- Model 3 003:** 120,000 8-bit bytes/second; for use with any S/370 Processor, with a 30XX Processor, with all 4300 Processors, 9375, 9377 Processors or 3800 Printing Subsystem.

- Model 5 005:** 200,000 8-bit bytes/second; for use with any S/370 Processor, with all 4300 Processors, 9375, 9377 Processors or 3800 Printing Subsystem.

- Model 7 007:** 320,000 8-bit bytes/second; for use with any S/370 Processors except 3115 and 3125, with all 30XX processors, all 4300 Processors, 9375, 9377 Processors or 3800 Printing Subsystem.

**Prerequisites:** A 3803 Tape Control.

**Limitations:** 3420 mdl 7 cannot be attached to the S/370 mdl 115 or 125.

If the 3420 mdl 5 is to be ordered for attachment to a selector sub-channel feature of the 2870, consult IBM.

Programming support for the extended diagnostic capabilities of the 3420 requires a minimum system size of 32K.

When attached to a S/360 mdl 30 operating in compatibility mode: (1) 3420 mdl 5 is not supported at 1600 bpi -- (2) 3420/1400 Compatibility (#9750) must be specified for the S/360 mdl 30. These limitations do not apply when the S/360 mdl 30 is operating in native mode for I/O operations; for example, under CS/30.

- When attaching to 9375 or 9377 Processor the 3803 Tape Control Unit must be attached to the Block Multiplexer Channel (#6003).

### HIGHLIGHTS

Radial attachment of tape drives to the control unit via a switch located in the control unit, permitting offline service of individual tape units without disturbing the subsystem. 24-line multiplex interface provides advanced diagnostic capability. MST circuitry reduces card count while increasing functions: Expanded sense data, better diagnostic capability, unique device identification, EC level and feature identification.

**Limitations:** IBM Multi-System Tape (MST) or equivalent is recommended for optimum performance. The minimum properties required for satisfactory performance are described in Tape Requirements for One-Half Inch Tape Units, GA32-0006.

**Automatic Threading and Cartridge Loading:** Threading is automatic with or without the wraparound cartridge; automatic retry (with cartridge only) in case of load failure, stopping on the leader to prevent damage to the recorded surface. With the wraparound cartridge, tape is not exposed to contamination or damage.

**9-track 1600 bpi Phase-encoding Operation:** Data is recorded parallel by bit, serial by byte, at 1600 bytes/inch, phase-encoded, in nine tracks across the width of the tape. The data format uses eight of the nine bits for data; the ninth bit is a parity bit. Data is recorded in odd parity. The eight bits of one byte can represent an alphabetic character, zoned decimal digit, two decimal digits (packed), a special character, or eight binary bits. The recording format is compatible with the 1600 bpi PE recording of tape units 2401, 2402, 2403, 2404, 2415 mdls 4, 5 and 6, and 2420 mdls 5 and 7. For 9-track 1600 bpi PE operation only, specify Single Density, #6631. See "Special

Features". Prerequisites: One of the following must be specified on the 3803 Tape Control: #9570 -- #3551 -- #6407.

**9-track 800 bpi NRZI Operation:** Tape is written at 800 bpi in the 9-track NRZI format as well as in the 1600 bpi PE format. Data representation is the same as for 1600 bpi PE operation. For 9-track 800 bpi NRZI capability, Dual Density (#3550) is required on the tape unit. See "Special Features". Prerequisites: #3551 on the 3803. (A 3420 with #3550 can operate in 1600 bpi PE mode with any 3803.)

**7-track Operation:** Tape is written in the 7-track format compatible with tapes written at either 556 or 800 bpi by 729/7330/7335 and 2401/2402/2403/2404/2415 tape drives equipped with 7-track read/write heads. For 7-track operation, Seven-Track (#6407) is required on the tape unit. See "Special Features". Prerequisites: #6408 on the 3803.

**Checking:** Each byte is parity-checked while tape is being read. Data written on tape is read back instantly and checked as in reading, with full parity check.

**Error Correction:** Single track drop-out errors are corrected "in flight" during 1600 bpi read operations.

**Read Backward:** All tapes (9- or 7-track) written on a 2401/ 2402/ 2403/ 2404/ 2415/ 2420 can be read by the 3420 in a forward or backward direction. The Data Conversion function is inoperative during backward read of 7-track tapes.

Characteristics	Mdl 3	Mdl 5	Mdl 7
Nominal Data Rate (Kb/sec)			
At 1600 bpi PE	120	200	320
At 800 bpi NRZI	60	100	160
At 556 bpi (7-tr.)	41.7	69.5	111.2
(Bytes/Inch)			
(1600/800/556)	Yes	Yes	Yes
Tape Speed (In./Sec.)	75	125	200
Nominal IBG (In.)			
9-track	0.6	0.6	0.6
7-track	0.75	0.75	0.75
Nominal IBG Time (ms)			
9-track	8.0	4.8	3.0
7-track	10.0	6.0	3.8
Rewind Time (2400 ft. Reel, Seconds)	60	60	45
Rewind-Unload Time (2400 ft. Reel, Sec.)	66	66	51
Auto Threading Time* (Seconds)	10	10	7
Nominal Read/Write Access** Time(ms)	4.0	2.9	2.0

\* From initiation (using mounted supply reel) to "Tape Drive Ready".

\*\* Access time is the interval from initiation of a write or forward read command until the first data byte is read or written when tape is brought up to speed from a stopped status.

**Publications:** GC20-0001

### SPECIFY

- Tape Density: One, and only one, of the following must be specified for each tape unit. This applies to MES orders (for field changes) as well. See "Special Features".
  - Single Density #6631 for 9-track 1600 bpi PE operation only.

## MACHINES

- Dual Density #3550 for 9-track 800 bpi NRZI operation as well as 1600 bpi PE.
- Seven-Track #6407 for 7-track 556 or 800 bpi NRZI operation.

Note: MES orders for these features to effect field changes should consider that one of these three features must be installed on the 3420 or it is incomplete.

- Power (AC, 3-phase):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Altitude: If 3420 tape drives are to be installed or pneumatics replaced at high altitude (4,001 to 8,000 feet), #9830 must be specified.
- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Machine Nomenclature:

English #2927  
French #2928  
German #2929

## SPECIAL FEATURES

**Dual Density (#3550):** Permits the tape unit to operate at 800 bpi NRZI 9-track as well as at 1600 bpi PE. Limitations: Cannot be installed with either Single Density (#6631) or Seven-Track (#6407).

**Field Installation:** Yes, except for machines with serial #9XXXX. **Prerequisites:** #3551 on the 3803 Tape Control.

**Seven-Track (#6407):** Permits the tape unit to operate at either 556 or 800 bpi NRZI in the 7-track format compatible with 729, 7330, 7335, and 2401, 2402, 2403, 2404, 2415 tape units equipped with 7-track heads. **Field Installation:** Yes, only to replace Dual Density (#3550) -- otherwise available at time of manufacture only. **Limitations:** Cannot be installed with either Single Density (#6631) or Dual Density (#3550). **Prerequisites:** #6408 on the 3803.

**Single Density (#6631):** Permits the tape drive to read or write tapes at 1600 bpi PE. **Prerequisites:** One of the following features must be specified for the 3803 Tape Control Unit: #9570, #3551 or #6408. **Field Installation:** Yes. **Limitations:** Cannot be installed with either Dual Density (#3550) or Seven-Track (#6407).

## MODEL CONVERSIONS

Can be made in the field.

	To Mdl 4	Mdl 5	Mdl 6	Mdl 7	Mdl 8
From					
Mdl 3	X	X	X	X	X
Mdl 5	X		X	X	X
Mdl 7	X		X		X

## ACCESSORIES (NONE)

## SUPPLIES

One standard 10-1/2" reel of magnetic tape in a wraparound cartridge is shipped with each tape unit. For additional reels of tape and cartridges, see IBM.

## 3420 MAGNETIC TAPE UNIT MODELS 4, 6, 8

### PURPOSE

- Magnetic tape unit for S/370, 30XX, 4300, 9375, 9377 Processors.

### MODELS 4, 6, 8

- Model 4 004:** 470,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, any 30XX Processor, any 4300 Processor, 9375, 9377 Processor, and with a 3800 Printing Subsystem.

- Model 6 006:** 780,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, any 30XX Processor, 4331 Model Group 2 and 11, 4341, 4361, 4381 Processor, 9375, 9377 Processor, and with a 3800 Printing Subsystem.

- Model 8 008:** 1,250,000 8-bit bytes/second for use with any S/370 Processor except 3115 and 3125, any 30XX Processor, 4331 Model Group 2 and 11, 4341, 4361, 4381 Processor, 9375, 9377 Processor, and with a 3800 Printing Subsystem.

**Limitations:** 3420 mdl 4, 6 and 8 via a 3803 Control Unit mdl 2 are not supported on byte multiplexer, multiplexer or 2870 selector subchannels at either 1600 bpi or 6250 bpi.

3420 Models 6 or 8 cannot be attached to a S/360 mdl 50. When contemplating the attachment of 3420 mdl 6 or 8 to S/370 mdl 135, 135-3, 145 or 145-3, consult System/370 Model 135 Channel Characteristics, (GA33-3010), System/370 Model 138 Channel Characteristics, System/370 Model 145 Channel Characteristics, GA24-3573, or System/370 Model 148 Channel Characteristics, IBM 4331 Channel Characteristics, GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2) or GA33-1550 (Mdl Group 11).

- Prerequisites:** A 3803 Tape Control mdl 2. When attaching to 9375 or 9377 Processor the 3803 Tape Control Unit must be attached to the Block Multiplexer Channel (#6003).

### HIGHLIGHTS

Nominal recording density of 6250 user bytes per inch with a 0.3-inch inter-block gap.

**Radial Attachment:** Attachment of tape drives to the control unit via a switch located in the control unit, permitting offline service of individual tape units without disturbing the subsystem. 24-line multiplex interface provides advanced diagnostic capability.

**Cleaning Mechanism:** A new cleaning mechanism is engaged during auto-threading, rewinding, and unloading operations to remove loose contaminants from the tape surface and to protect the recording head. This new cleaning mechanism makes tape cleaning a byproduct of tape processing. The cleaning mechanism does not, however, replace drive cleaning performed by the operator, nor does it replace the need for normal library maintenance.

**Automatic Threading and Cartridge Loading:** Threading is automatic with or without the wraparound cartridge; automatic retry (with cartridge only) in case of load failure, stopping on the leader to prevent damage to the recorded surface. With the wraparound cartridge, tape is not exposed to contamination or damage.

**Automatic Read Amplification:** Automatically adjusts the amplifier gain in the tape drive to each individual reel of tape when operating at 6250 bpi.

**Checking:** Data written on tape is read back instantly to ensure later readability.

**Read Backward:** Tapes written at 6250 bpi mode can be read in a forward or backward direction. Tapes written at 1600 bpi

(phase-encoded) mode can be read in a forward or backward mode if the 3420 mdl 4, 5 or 8 is equipped with the 6250/1600 optional feature.

**6250/1600:** Optional feature allows the 3420 mdl 4, 6 or 8 to read and record at 1600 bpi (phase-encoded) density as well as 6250 bpi density.

**Tape Media:** IBM Multi-System Tape (MST) or equivalent is recommended for optimum performance. The minimum properties required for satisfactory performance are described in "Tape Requirements for One-Half Inch Tape Units", GA32-0006.

Characteristics	Mdl 4	Mdl 6	Mdl 8
Tape Speed (ips)	75	125	200
Recording Density			
6250/1600	Yes	Yes	Yes
Nominal Data Rate			
at 6250 Kb/sec.	470	780	1250
at 1600 Kb/sec.	120	200	320
Nominal IBG (in)			
at 6250	0.3	0.3	0.3
at 1600	0.6	0.6	0.6
Nominal Read/Write Access (ms) *			
at 6250	2.3/ 2.1	1.6/ 1.5	1.1/ .95
at 1600	4.0/	2.6/	1.7/
Maximum Rewind Time (seconds)	70	60	45
Maximum Rewind-unload (sec.)	76	66	51
Maximum Auto Thread (sec.) **	10	10	7

\* Access time is the time required to read or write the first byte of data in a block after a read/write instruction has been initiated from a stopped position (read/write head positioned in the IBG).

\*\* From initiation (using mounted supply reel) to "Tape Drive Ready".

### SPECIFY

- Tape Density: One and only one of the following must be specified for each tape unit (see "Special Features"):

#6420 for 6250 bpi density only.

#6425 for 1600 bpi density (phase-encoded) as well as 6250 bpi density.

- Power (AC, 3-phase, 4-wire): Must be consistent with system voltage.

50 Hz	60 Hz
200V #2807	208V #9903
220V #2815	230V #9905
235V #2818	
380V #2816	
408V #2819	

- Altitude: If 3420 tape drives are to be installed or pneumatics replaced at high altitude (4,001 to 8,000 feet), #9830 must be specified.

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.

- Machine Nomenclature:

## MACHINES

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931

## MODEL CONVERSIONS

	To	Mdl 6	Mdl 8
From			
Mdl 4		X	X
Mdl 6			X

## SPECIAL FEATURES

**6250 Density (#6420):** Permits the tape unit to operate at 9-track 6250 bpi. Limitations: Cannot be installed with 6250/1600 density (#6425).

**6250/1600 Density (#6425):** Permits the tape unit to operate at 6250 bpi density as well as 1600 (phase-encoded) density either this feature or #6420 must be specified. Limitations: Cannot be installed with 6250 Density (#6420).

## ACCESSORIES (NONE)

## SUPPLIES

One standard 10-1/2 inch reel of magnetic tape tested for 6250 bpi in an easy-load cartridge is shipped with each tape unit. For additional reels of tape and cartridges, see IBM.

## 3422 MAGNETIC TAPE SUBSYSTEM

### PURPOSE

The 3422 is a 10-1/2 inch reel intermediate performance magnetic tape subsystem. The 3422 records or reads data at 6,250 bpi or 1600 bpi. The 3422 has a tape speed of 125 inches per second (ips). This allows a nominal data rate of 780KB per second at 6,250 bpi or 200KB per second at 1,600 bpi.

The 3422 consists of a model A01 with a tape control and one tape drive housed in the same frame and a model B01 with one tape drive only. A maximum of seven model B01s can be attached to a model A01 for a total of eight drives per string. The primary use of the 3422 will be as a save/restore and processing device on intermediate systems and as a 10-1/2 inch reel companion drive for 3480 tape subsystems.

The 3422 will attach to the 43XX, 308X, 3090, 5381 mdls 6, 7, and 8, 5382 mdls 18, 20 and 40, and 9370.

Optional features for the 3422 include a 64K byte speed-matching buffer that supports data streaming mode and allows up to three megabytes per second data transfer rate between the channel and the control unit. Also offered is a two-channel switch and a communicator that allows the 3422 control unit to attach to a second 3422 control unit and be able to address up to 16 tape units (2x16). Data streaming mode and the communicator are not supported on the S/38.

Programming support for the 3422 Magnetic Tape Subsystem is provided by VSE/SP (VSE/AF), VM/SP, VM/SP HPO, VM/XA Systems Facility, MVS/SP, and CPF.

### MODELS

**Model A01:** Tape control and one tape drive

**Model B01:** One tape drive only

**Prerequisites:** An available control unit position on a block multiplexer channel. Feature code #7970-3422/3430 magnetic tape attachment is required on the 5381 or 5382.

Attaches to a 43XX, 308X, 3090, 5381 mdls 6, 7, and 8, 5382 mdls 18, 20, and 40, and 9370.

**Maximum:** A maximum of seven B01 models can be attached to an A01 model for a total of eight drives per string. A maximum string of three B01s and one A01 is supported on the System/38.

**Limitations:** A 3422 mdl A01 must be the first drive of a string.

### HIGHLIGHTS

- Dual-density: 6,250/1,600 bpi.
- Nominal data rate of 780KB per second at 6,250 bpi.
- Optional two- and three-megabyte data streaming channel mode via a 64K speed matching buffer on 370 Architecture Systems.
- Auto thread/auto load of 10-1/2 inch reel contained in wraparound cartridge.
- Up to eight tape units per string on 370 Architecture Systems.
- Up to four tape units per string on System/38.
- Reduced power and space requirements over 3420/3803 Magnetic Tape Subsystem.

### Characteristics:

Recording Density	6,250/1,600 bpi (246/63 B/mm)
Tape Speed	125 ips (318 cm/sec)
Data Rate, Nominal	
at 6,250 bpi (246 B/mm)	780Kb/sec
at 1,600 bpi (63 B/mm)	200Kb/sec
Nominal IBG	
at 6,250 bpi	7.6mm (0.3 in.)
at 1,600 bpi	15.2mm (0.6 in.)
Nominal Read Access Time*	
6,250 bpi	2.6ms
1,600 bpi	3.9ms
Nominal Write Access Time*	
6,250 bpi	1.8ms
1,600 bpi	3.6ms
Rewind Time	
2,400 ft reel (731.5m)	1.2 minutes

\* Access time is the time required to read or write the first byte of data in the block after a read/write instruction has been initiated from a stopped position in the IBG.

**Bibliography:** GC20-0001

### SPECIFY

- Power: #9010 for 60 Hz, #9005 for 50 Hz.
- Communicator cable length: (Mdl A01 only, prerequisite #3010) #9020 for 10 meter, #9025 for 30 meter.
- Machine Nomenclature:
  - Brazilian Portuguese #2938
  - English #2924
  - French #2928
  - Spanish #2931
- Color: Pebble gray only.

### MODEL CONVERSION (NONE)

### SPECIAL FEATURES

These features can only be installed on the model A01.

**Two-Channel Switch (#3005):** Allows the 3422 control unit to be attached to two System/370 mode-only host channels or two System/38 tape adapters. Maximum: One. Field Installation: Yes.

**Communicator (#3010, #3015):** Allows the 3422 control unit to attach to a second 3422 control unit and to be able to address up to 16 tape units (2x16). If the Communicator is being ordered, the first 3422 control unit must be identified as the primary (#3010) and the second 3422 control unit must be identified as the secondary (#3015). In addition, the Communicator cable length (#9020 or #9025) must be specified with the primary (#3010) 3422 control unit. Cable length choices are 10 meters or 30 meters. Maximum: One. Field Installation: Yes. Limitation: Cannot be installed on the System/38.

**Data Streaming (#3020):** Supports attachment of the 3422 to either a two-megabyte or three-megabyte data streaming channel. Maximum: One. Field Installation: Yes. Limitation: Cannot be installed on the System/38.

**IBM** IBM Canada Ltd.

**MACHINES**

**M 3422.2**  
NOV 86

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 3430 MAGNETIC TAPE SUBSYSTEM

### PURPOSE

Magnetic tape Subsystem for System/38 Models 4, 5, 6, 7, and 8, Virtual Storage S/370 Models 135 - 168, 4331, 4341, 4361, 4381, 3031, 3032, 3033, and 9370.

### MODELS

**Model A01:** Tape control and a single tape unit.

**Model B01:** Second, third, or fourth tape units which attach to the Model A01.

**Maximum Configuration:** Up to 3 3430 Model B01s may be attached to a 3430 Model A01 for a total of 4 drives.

### Prerequisites:

- A 3430 Model A01 must be the first drive of the string.
- 4331 Model Group 1 and 2, 4361 - Block Multiplexer Channel (#1421).
- System/38 - 3430 Attachment (#7970).
- 9370 Attachment (#6003).

The 3430 Tape Subsystem attaches via the selector, or the block multiplexer channels of 370 Models 135 - 168, 4331, 4341, 4361, 3031, 3032, 3033, or 9370.

### HIGHLIGHTS

- Dual-density 246/63 bytes per mm (6,250/1,600 bytes per inch).
- LSI components for improved reliability.
- Instantaneous data rate of 312,500 bytes per second at 246 bytes per mm (6,250 bytes per inch).
- Radial attachment of tape drives for ease of service.
- Space saving as a result of compact packaging and control unit housed in first drive.
- Micro-diagnostic package for offline diagnosis and repair verification.

**Checking:** During a write operation, both parity and signal amplitude are checked. During a read operation, parity is checked.

**Error Correction:** Reading at 246 bytes per mm (6,250 bytes per inch), double-track errors are corrected automatically "in flight". Reading at 63 bytes per mm (1,600 bytes per inch) single-track errors are corrected automatically "in flight".

### Characteristics:

Data Rate, Instantaneous	
63 B/mm (1,600 Bpi)	80kb/sec
246 B/mm (6,250 Bpi)	312.5kb/sec
Recording Density	
	246/63 B/mm
	(6,250/1,600 Bpi)
Tape Speed	
Nominal IBG	127cm/s (50 ips)
63 B/mm (1,600 Bpi)	15mm (0.6 in.)
246 B/mm (6,250 Bpi)	11mm (0.45 in.)
Write	8/11mm
Read	(0.3/0.45 in.)
Nominal Read/Write Access Time *	
63 B/mm (1,600 Bpi)	6.0ms

246 B/mm (6,250 Bpi)	6.0ms
Rewind Time per Reel	
610m (2,400 feet)	2.7 minutes

\* Access time is the time required to read or write the first byte of data in the block after a read/write instruction has been initiated from a stopped position in the IBG.

**Magnetic Tape:** IBM Multi-System Tape (MST), or equivalent, is recommended for optimum performance. The minimum properties required for satisfactory performance are described in "Tape Requirements for One-Half Inch Tape Units" (GA32-0006).

### Publications:

- GA32-0069 IBM 3430 Magnetic Tape Subsystem Introduction
- TNL to GC22-7064 IBM I/O Equipment Installation Manual, Physical Planning for System/360 and System/370
- TNL to GA32-0039 IBM Input/Output Device Summary
- GA32-0079 IBM 3430 Operator's Guide (Booklet)
- GA32-0076 IBM 3430 Magnetic Tape Subsystem Description
- GA32-0006 Tape Requirements for IBM One-Half Inch Tape Units
- GA21-9293 IBM System/38 Installation Manual - Physical Planning
- GC22-7004 IBM System/370 Installation Manual - Planning

### SPECIFY

- Power (200V AC or higher):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Power Cord Connector: #9220 for twist lock non-waterproof power cord connector. (Waterproof power connector will be supplied unless #9220 is specified.)

- Color: #9065 for Pebble Gray, #9061 for Garnet Rose, #9063 for Classic Blue, #9060 for Willow Green, #9064 for Charcoal Brown, #9062 for Sunrise Yellow.

- Machine Nomenclature:

Brazilian #2938	French #2928
Canadian English #2934	German #2929
Canadian French #2935	Italian #2932
English #2924	Spanish #2931

### SPECIAL FEATURES

**Multiple Drive Attachment Feature (#4991):** If the number of tape units in the string exceeds 2 tape units (i.e., the second Model B01 is to be attached), the multiple drive attachment feature must be specified to be installed in Model A01, 1 feature per Model A01. Field Installation: Yes.

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3480 MAGNETIC TAPE SUBSYSTEM

### PURPOSE

The 3480 mdl A11 and B11, designed for intermediate systems, is the newest 3480 family member. Data is recorded on 18 tracks of tape contained in a compact cartridge (Cartridge System Tape) introduced for use with the 3480 Magnetic Tape Subsystem. This model of the 3480 has a nominal data rate of 1.5 million bytes per second, and a linear recording density of approximately 38,000 bytes per inch. This 3480 Magnetic Tape Subsystem consists of a 3480 Mdl A11 Control Unit and a 3480 Mdl B11 Magnetic Tape Unit (has two drives). The 3480 mdl A11 Control Unit attaches up to four 3480 mdl B11 Magnetic Tape Units. The maximum subsystem configuration is two coupled 3480 mdl A11 Control Units attached to eight channels and controlling eight 3480 mdl B11 Magnetic Tape Units. A host processor may attach multiple 3480 Magnetic Tape Subsystems. Optional features for the 3480 mdl A11 and B11 include: Dual Control Unit Communications, Control Unit Coupler, up to three additional Channel Attachments, and an Automatic Cartridge Loader. A 3480 mdl A11 and B11 can be Field Upgraded to a 3480 mdl A22 and B22, by installing the Model Upgrade Package and the Dual Control Unit Communications Feature. Models A11 and B11 may not be intermixed in the same subsystem with mdls A22 and B22.

### MODELS

**Model A11:** Control Unit

**Model A22:** Control Unit

**Model B11:** Magnetic Tape Unit

**Model B22:** Magnetic Tape Unit

**Limitations:** Models A11 and B11 may not be intermixed in the same subsystem with mdls A22 and B22. Cable limitations are identified in "IBM System/370 Installation Manual, Physical Planning" (GC22-7064).

**Maximum Configuration:** Two model A11 Tape Control Units may be connected together by installing the Control Unit Coupler (#3211) and the Dual Control Unit Communications feature (#3201) to provide data paths from each control unit to the four mdl B11 Magnetic Tape Units (eight drives) on each mdl A11 control unit. In the same manner, two mdl A22 Tape Control Units may be connected together by the Control Unit Coupler to provide data paths from each control unit to the four mdl B22 Magnetic Tape Units (eight drives) on each mdl A22 control unit. Mdl A11 Control Units and B11 Tape Drives may not be intermixed in the same subsystem as mdl A22 Control Units and B22 Tape Drives. Special features provide attachment of up to three additional channels per CU. Maximum resultant configuration is two control units attached to eight channels accessing eight 3480 Magnetic Tape Units (16 drives). The Dual Control Unit Communications feature #3201 is not standard on the A11 Control Unit and must be installed for the above maximum configuration to be attained.

**Prerequisites:** For the Magnetic Tape Control Unit, mdl A11 or A22, there must be an available channel Control Unit position. The Control Unit and the Magnetic Tape Unit must both be of the same model designation.

### HIGHLIGHTS

#### 3480 Mdl B11 or B22 Magnetic Tape Unit

- Reads and writes data at an instantaneous data rate of approximately 1.5 or 3 million bytes per second, respectively.
- Linear recording density of approximately 38K BPI.
- Records 18 tracks on tape, enclosed in a plastic cartridge.

- Advanced mechanical and electronic components, micro-processor control, and a new error correction code.
- Low velocity tape operation, digital tachometers and control unit data buffering eliminate the requirements for traditional capstan and vacuum columns and provide a compact drive with lower power and cooling requirements.
- Display of messages on each drive, cleaning cartridges, and automatic tape threading enhance operator productivity.
- The mdl B11 can be field upgraded to a mdl B22.
- Automatic Cartridge Loader can be installed on both the B11 and B22.

#### 3480 Mdl A11 or A22 Control Unit

- Attaches to non-streaming block multiplexer channels.
- Attaches to 1.5M, 2M or 3M bps streaming channels.
- Controls up to four units (eight drives), respectively. (Must be all of same model designation.)
- Two Control Units, of the same model designation, may be coupled together for mutual access to all 16 attached drives.
- Incorporates 512KB data buffer (Model A11) or 1,024Kb data buffer (Model A22) for channel speed data response to the host processor, and masking of tape motion from host.
- Utilizes host independent error correction code.
- Error recovery and logging in control unit and/or host.
- Provides a Data Security Erase function which, when invoked, overwrites previously written data with a random data pattern.
- The mdl A11 can be field upgraded to a mdl A22 by installing the Model Upgrade Package and the Dual Control Unit Communications Feature.

#### Subsystem Characteristic Summary

##### Drive:

- Instantaneous data rate (M bps): 1.5 and 3 for B11 and B22 respectively
- Linear recording density (K BPI): 38 (approximately)
- Parallel recording tracks: 18
- Load/Unload time (sec): 7
- Cartridge rewind time (sec): 48.0 (approximately)

**Control Unit:** Data Buffer (KB): 512 (Model A11), 1,024 (Model A22)

**Cartridge:** Cartridge Capacity (MB) (24K blocks): 200\*

\* Nominal IBM Cartridge System Tape (CST) capacity is 200MB at a data block size of 24K. Individual cartridges have normal variations due to manufacturing tolerances. Data written on a standard 10.5 inch reel of magnetic tape at 6,250 bpi in block sizes of 4KB or larger, typically will be contained in a tape cartridge.

**Description:** The 3480 mdl A11 Control Unit attaches up to four 3480 mdl B11 and the 3480 mdl A22 Control Unit attaches up to four 3480 mdl B22. Each 3480 B11 or B22 houses two tape drives. Each A11 and A22 can have a maximum of eight tape drives per control unit. Two Control Units, of the same model designation, may be coupled together with the Dual Control Unit Coupler providing concurrent access by the two control units to their attached 16 drives. Each control unit provides for attachment of up to four channels; one channel attachment is standard. Up to three Additional Channel Attachment features may be added to each control unit. A full-featured two control unit subsystem can thus attach up to 16 drives and to as many as eight host channels. Mdls A11 and B11 may not be intermixed in the same subsystem with mdls A22 and B22.

A message display integral to each drive indicates drive status. The message display can also be used by the host software when operating in full function mode. Messages are available in one of six languages.

Operator productivity may be improved by installing the Automatic Cartridge Loader (#2511) which allows the operator to premount up to five cartridges per drive in addition to a cartridge already mounted in the drive.

Data to be read or written on tape is buffered in the Control Units 512KB Buffer. The Control Unit dynamically allocates buffer space for performance optimization of the attached drives. The data buffer is designed to mask drive repositioning actions from the channel and the host. At completion of tape motion, the tape coasts beyond the interblock gap. The drive then positions tape for the next operation.

Initial error correction and error logging occurs in the control unit. If control unit error recovery is unsuccessful, host software error recovery may be initiated.

**Configuration:** The Magnetic Tape Unit contains two drives in a single frame. A maximum of four frames (eight drives), of the same model designation, may be attached to one Control Unit. Two Control Units, of the same model designation, may be coupled together via the Dual Control Unit Coupler, providing concurrent access by the two control units to their associated 16 drives. Each control unit provides for attachment of up to four channels; one channel attachment is standard. Up to three Additional Channel Attachment features (#1511, #1512, #1513) may be added to each control unit. A full-featured two control unit subsystem can attach up to 16 drives (8 B11s or B22s) and as many as eight host channels. Host systems may attach multiple 3480 Magnetic Tape Subsystems.

All special features are field installable. The Dual Control Unit Communications feature is integrated on the mdl A22 and optional on the mdl A11. This feature can be both factory and field installed. The mdls A11 and B11 are field upgradable to mdls A22 and B22; however, the Dual Control Unit Communications feature is required for the mdl A11 conversion.

### Processor Attachment:

System	Non-Streaming Block Mltplxr	2M bps Block Mltplxr	3M bps Block Mltplxr
303X*	X		X
308X	X		X
4341	X	X	X
4361**	X	X	X
4381	X	X	X
3090	X		X
9373	X		
9375	X	X	X
9377	X	X	X

\* Data Streaming (#4850) required for operation in data streaming mode.

\*\* Data Chaining is not supported on 3480 A11, A22, B11 or B22.

### SPECIFY

- (Japan only > Voltage (AC, 3-phase, 4-wire, 60 Hz):
 

200V	#2733	208V	#9903
220V	#2800	240V	#9915<)
  - (Except Japan > Voltage (AC, 3-phase, 4-wire, 60 Hz):
 

200V	#2733	208V	#9903
220V	#2800	240V	#9915
- Voltage (AC, 3-phase, 5-wire, 50 Hz):

200V	#2807	220V	#2815
230V	#2827	240V	#2818
380V	#2816	400V	#2825
415V	#2826	<)	

- (Japan only > Voltage (AC, 3-phase, 4-wire, 50 Hz):

200V	#2807	220V	#2815
240V	#2818	230V	#2827<)

- Color: Standard color is Pearl White (#9066). End covers are available in an accent color. If desired, specify one accent color for the mdl A11 or A22 only. #9060 for Willow Green, #9061 for Garnet Rose, #9062 for Sunrise Yellow, #9063 for Classic Blue, #9065 for Pebble Gray, #9064 for Charcoal Brown. If no accent color is specified, end covers will be Pearl White (#9066). Maximum: One.
- Machine Nomenclature: Specify for both Control Unit and Magnetic Tape Unit.
 

Brazilian (Portuguese)	#2938
English	#2927
French	#2928
French Canadian	#2928
German	#2929
Italian	#2932
Japanese (mdls A11 or A22 only)	#2930
Spanish	#2931
- If no language is specified, English (#2927) is supplied.
- The Message Display will be provided in the same Language as the Machine Nomenclature. No specify required.

### SPECIAL FEATURES

#### Mdls A11 and A22 Control Unit:

**Channel Attachment, First Additional (#1511):** Provides mdl A11 or A22 Control Unit attachment to the first additional channel. Maximum: One. Field Installation: Yes.

**Channel Attachment, Second Additional (#1512):** Provides mdl A11 or A22 Control Unit attachment to the second additional channel. Maximum: One. Prerequisites: #1511. Field Installation: Yes.

**Channel Attachment, Third Additional (#1513):** Provides mdl A11 or A11 Control Unit attachment to the third additional channel for the full compliment of four channel attachments. Maximum: One. Prerequisites: #1512. Field Installation: Yes.

**Control Unit Coupler (#3211):** This coupler consists of two cables which, when connected to two 3480 mdl A11 or mdl A22 control units, permit the control units to access all (16) drives of the combined subsystem. Order only one coupler to couple two control units. Control Units must be of the same model. Maximum: One. Prerequisites: Yes. Feature #3201 must be installed on both A11s. Field Installation: Yes.

**Dual Control Unit Communications (#3201):** This feature when activated by the Control Unit Coupler (#3211) will allow up to eight (8) 3480 B11s to be attached to two (2) 3480 A11s. Mdls A11 and B11 may not be intermixed in the same subsystem with mdls A22 and B22. Maximum: One. Prerequisites: No. This feature (#3201) is a prerequisite for Model Conversion from A11 to A22. Field Installation: Yes.

#### Mdl B11 and B22 Magnetic Tape Unit:

**Automatic Cartridge Loader (#2511):** Automatic Cartridge Loader provides automatic cartridge mounting and demounting capability for two drives in 3480 Magnetic Tape Unit. One to five additional cartridges per drive may be premounted by the operator. Six cartridges per drive can be automatically demounted without operator

intervention. Maximum: One per mdl B11 or B22. Prerequisites:  
None. Field Installation: Yes.

**ACCESSORIES (NONE)**

**MODEL CONVERSIONS**

To convert mdls A11 and B11 to mdls A22 and B22, the Dual Control Unit Communications feature (#3201) must be installed prior to or with this model conversion.

**SUPPLIES**

**Tape Cartridges:** One new IBM Cartridge System Tape (CST) and a tape cleaning cartridge are shipped with each 3480 mdl A11 Control Unit. For additional cartridges, contact your IBM representative.

## 3505 CARD READER

### PURPOSE

Punched card input unit for a S/360 mdl 195, or all S/370, 30XX, 4300 processors.

### MODELS

Rated 80-Column  
Card Speed

Model B1	B01	800/minute
Model B2	B02	1200/minute

### HIGHLIGHTS

The 3505 is a high-speed, fully buffered, card reader, containing its own control unit. With appropriate adapter and control features installed (see "Special Features"), the 3505 provides the power and logic to control one 3525 Card Punch.

All mdls have a 3,000-card capacity file feed and two 1,750-card capacity non-programmable stackers, which operate in an alternating mode. Feeding from the file feed hopper is by means of friction feed rolls with vacuum assist. Failure to feed a card from the hopper is followed automatically by up to three retries before the machine stops.

All mdls have read-column-eliminate capability, which provides the user with the ability, under program control, to suppress the reading of selected card columns. It is recommended to prevent reading in columns that could cause validity and read checks due to invalid codes or open-punched card scores.

Holes in the card are read by a light-sensing mechanism, which is checked for correct operation in every card cycle. Cards punched in either the Extended BCD Interchange Code (Data Mode 1) or Card Image (Data Mode 2) can be read. Machine checks are made for invalid codes (Data Mode 1 punching only), off-punching, and mispositioned cards.

**Maximum:** The number of 3505 mdls B1 and/or B2 that can be attached depends upon the number of system channel control unit positions available.

**Prerequisites:** Each 3505 requires an available control unit position on a system channel.

- S/360 and S/370 mdl 195: Selector channel of 2860, basic multiplexer channel of 2870, block multiplexer channel of 2880 ... see M2860, 2870, 2880 pages.
- S/370 mdl 115, 125: Byte multiplexer channel (special feature) ... see M3115, 3125 pages.

- S/370 mdl 135: Byte multiplexer channel (standard), selector channels (special features), block multiplexer channels (special features) ... see M3135 pages.
- S/370 mdl 135-3: Byte multiplexer channel (standard), or block multiplexer channels (special feature) ... see M3135-3 pages.
- S/370 mdl 138: Byte multiplexer channel (standard), block multiplexer channels (standard) ... see M3138 pages.
- S/370 mdl 145: Byte multiplexer channel (standard), selector channels first one is standard), block multiplexer channels (special features) ... see M3145 pages.
- S/370 mdl 145-3: Byte multiplexer channel (standard), block multiplexer channels ... see M3145-3 pages.
- S/370 mdl 148: Byte multiplexer channel (standard), or block multiplexer channels (standard) ... see M3148 pages.
- S/370 mdls 155, 158: Byte multiplexer channel (standard), second byte multiplexer channel (special feature), block multiplexer channels (first two are standard) ... see M3155 and 3158 pages.
- S/370 mdls 165, 168: Selector channel of 2860, basic multiplexer channel of 2870, selector sub-channels (special features) on 2870, block multiplexer channel of 2880 ... see M2860, 2870, 2880 pages.
- 3031, 3032 Processor: Byte multiplexer channel (one is standard), block multiplexer channels (five are standard) ... see M3031, 3032 pages.
- 3033 Processor: Byte multiplexer channel (two are standard), block multiplexer channels (ten are standard) ... see M3033 pages.
- 3081, 3083, 3084 Processor: Byte multiplexer channels, block multiplexer channels ... see M3081, 3083, 3084 pages.
- 3090 Processor: Byte multiplexer channels, block multiplexer channels ... see M3090 pages.
- 4300 Processor: Byte multiplexer channel, block multiplexer channel. See M4331, 4341, 4361, 4381 pages.

**Card Limitations:** Generally, special feature cards require careful handling and a favorable environment. Use of the following card features has been approved:

- Internal Scores (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3 and S-1. Note: When using OM-2 or OM-3, either reading must

be terminated prior to the column that is scored, or, reading of the scored column and the two adjacent columns must be suppressed by means of the program-controlled Read Column Eliminate feature (see "Special Features"). S-2 may be used prior to folding, and after folding if the card is properly flattened.

- External Scores (after separation): Column 1 and 80 end: M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. Column 1 end only: OM-3. 12 and 9 edge: CF-1/9A. When using CF-1/9A scores on 51-column cards, consult IBM.
- Corner Cuts: Any corner: C1, C2, C3, and C5.
- Card Stock: Regular, edge-coated, and heavy duty.
- Port-A-Punch(R): Can be processed.

All other special feature cards may result in unsatisfactory performance and should be tested in an actual application prior to being recommended.

**Publications:** S/360 -- GC20-0360, S/370 -- GC20-0001

## SPECIFY

- Voltage (AC, 3-phase, 4-wire, 60 Hz): #9903 for 208V or #9905 for 230V ... must be consistent with system voltage.
- (Except Canada > Power (AC, 3-phase): Must be consistent with system voltage.

50 HZ	60 HZ
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Machine Nomenclature:
 

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931
- High Altitude Group: #9220 (60 Hz) or #2737 (50 Hz) is to be specified when card reader is to be installed at an altitude exceeding 4,300 feet.

## SPECIAL FEATURES

(Japan only > 3525 Katakana Card Print Control (#2707): Provides control for 3525 Card Punch features: Basic Card Print (#1421) and Two-line Katakana Card Print (#2861) or Multiline Katakana Card Print (#2862). Limitations: Cannot be installed with 3525 Card Print Control

(#8100). Field Installation: Yes. Prerequisites: #8103 or #8105 on the 3505 ... #2861 or #2862 on the 3525.

**Interchangeable Read Feed, 51/80-Column (#3921):** (mdl B2) For feeding and reading 51-column cards. The 51 columns of data appear in positions 1 through 51 of the 80-position buffer. A special card weight, file feed, hopper liners and stacker guide assemblies are provided so that the operator can adjust for 80- or 51-column operations. Intermixed cards on the same operation are not supported. Reading speed of the 3505 is maintained. With this feature installed, the capacity of each stacker is permanently reduced to 1,500 cards. Can be used with all other 3505 features. Field Installation: Not recommended.

**Optical Mark Read (#5450):** For reading up to 40 columns of marked data. Marked and/or punched-hole data can be read from a card. Columns in which marks are unacceptable are transmitted as Hex '3F' characters. Same validity checking applies as for holes. Can be used in Card Image Mode, in which case the validity check is suspended. Note: See GA21-9124 for card and format specifications. It is recommended that Selective Stacker (#6555) be installed for program-selecting poorly marked cards. Limitations: Cannot be used simultaneously with the Read Column Eliminate function. Field Installation: Yes.

**Selective Stacker (#6555):** Provides a third stacker (second logical stacker), which permits time-independent card selection under program control. Card capacity is 1,750 cards. When actually using this feature under DOS, the maximum speed of mdl B2 on the 3115 or 3125 is approximately 1,150 cards/minute. Field Installation: Yes.

**3525 Card Print Control (#8100):** Provides control for Basic Card Print (#1421) installed on a 3525 Card Punch. Field Installation: Yes. Prerequisites: Either #8103 or #8105. Specify: Either #9791 for two-line, or #9792 for multiline. Limitations: Cannot be installed with Katakana Card Print Control (#2707).

**3525 Punch Adapter (#8103):** Permits attachment of the 3525 Card Punch without Card Read (#1533). Limitations: Cannot be installed with #8105. Field Installation: Yes.

**3525 Read Punch Adapter (#8105):** Permits attachment of the 3525 Card Punch equipped with Card Read (#1533). Limitations: Cannot be installed with #8103. Field Installation: Yes.

## MODEL CONVERSIONS

Field installable.

## ACCESSORIES (None)

## SUPPLIES (None)

## MACHINES

**3525 CARD PUNCH**
**PURPOSE**

Punched card output unit for a S/360 mdl 195, any S/370 processor, any 30XX processor, 4331 or 4341 Processor.

**MODELS**

		Rated 80-column Card Speed
Model P1	P01	100/minute
Model P2	P02	200/minute
Model P3	P02	300/minute

**Maximum:** S/360 mdl 195 and any S/370 (except mdl 125), 30XX, 4300 processor: One 3525 can be attached via each 3505 Card Reader mdl B1 or B2. S/370 mdl 125: One 3525 can be natively attached via the appropriate adapter on the 3125 ... see M3125 pages.

**Prerequisites:** S/360 mdl 195 and any S/370, 30XX, 4331 or 4341 processor: A 3505 Card Reader mdl B1 or B2 with a 3525 Punch Adapter (#8103), or 3525 Read Punch Adapter (#8105). S/370 mdl 125: Native attachment via the Integrated 3525 Card Punch Attachment (#4685) on the 3125.

**HIGHLIGHTS**

The 3525 is a full-function card punch which, when equipped with the appropriate special features, can read and/or print as well as punch 80-column cards in a single pass through the machine. The 3525 attaches natively to a S/370 mdl 125, or via (and within 20 feet of) a channel-attached 3505 Card Reader mdl B1 or B2 to a S/360 mdl 195, or any S/370, 4300 processor ... see "Prerequisites" above.

The basic unit has a 1,200 card capacity hopper and two 1,200 card capacity stackers. Either the EBCDIC (256 codes) or Card Image (Data Mode 2) can be punched. Punches parallel, row by row. Cards go to stacker 1 unless program directed to stacker 2.

Card punching is checked by monitoring the movement of all 80 punches. A card in which a punching error is detected is automatically directed to a dedicated 200-card capacity error stacker and followed by two automatic punching retries ... the first prepunched card is directed to the error stacker for analysis purposes ... the second prepunched card is directed to the stacker originally selected for the error card. **Note:** Because of automatic punch retry, it is recommended that prepunched or serially numbered preprinted cards not be used in a punch-only mode. When operating in a read/punch mode ... see Card Read in "Special Features" ... detected punching errors do not result in an automatic punching retry and prepunched or serially numbered preprinted cards can be used. In a read/punch mode, a detected punching error causes the machine to stop and manual error recovery procedures are required.

**Card Limitations:** Generally, special feature cards require careful handling and a favorable environment. Use of the following has been approved:

**Internal Scores** (before separation): M-4, M-5, OM-2, OM-3, ID-1, ID-2, ID-3 and S-1. When reading cards with internal OM-2 or OM-3 scores (Card Read feature installed), either reading must be terminated prior to the column that is scored, or reading of the scored column and the two adjacent columns must be suppressed by means of the program-controlled read-column-eliminate feature function provided standard with Card Read. S-2 may be used prior to folding, and after folding if the card is properly flattened.

**External Scores** (after separation): Column 1 and 80 end: M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. Column 1 end only: OM-3. 12 and 9 edge: CF-1/9A.

**Corner Cuts** (any corner): C1, C2, C3 and C5.

**Card Stock:** Regular, edge-coated, and heavy duty.

**Port-A-Punch®:** Can be punched in unscored fields of the card. Scored columns of these cards cannot be read. If reading capability is required, contact IBM.

All other special feature cards may result in unsatisfactory performance and should be tested in an actual application prior to being recommended.

**Publications:** S/360 -- GC20-0360, S/370, 4300 -- GC20-0001

**SPECIFY**

(Canada only+)

- Voltage (AC, 60 Hz power provided by the 3125 for native attachment or by the 3505 mdl B1 or B2 for channel attachment):

#9903 for 208V or #9905 for 230V ... must be consistent with 3505 or system voltage. +)

- Power (AC): Provided by the 3125 for native attachment or by the 3505 Card Reader mdl B1, B2 for channel attachment. Specify same voltage feature number as for 3505 or 3125.

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- S/370 mdl 125 Adapter (#9690): Required if the 3525 is to be attached via an Integrated 3525 Punch Attachment (#4685) on a 3125. **Field Installation:** Yes.

(Canada only+)

- Print Character Set: Required when Multiline Card Print (#5273) or two-line Card Print (#8339) is ordered. #9677 -- for EBCDIC or #9671 -- for ASCII. **Field Installation:** Yes.

Card Code	EBCD Code	EBCDIC	ASCII	Card Code	EBCD Code	EBCDIC	ASCII
	0100-				0110-		
12-8-2	1010	¢	[	11	0000	/	/
12-8-3	-1011	.	.	0-1	-0001	blank	\
12-8-4	-1100	<	<	12-11	-1010		
12-8-5	-1101	(	(	0-8-3	-1011	%	%
12-8-6	-1110	+	+	0-8-4	-1100		
12-8-7	-1111			0-8-5	-1101	>	>
	0101-			0-8-6	-1110	?	?
12	0000	&	&	0-8-7	-1111		
11-8-2	-1010	!	!	0111-		:	:
11-8-3	-1011	\$	\$	1010		#	#
11-8-4	-1100	*	*	-1011		@	@
11-8-5	-1101	)	)	-1100			
11-8-6	-1110	:	:	-1101		=	=
11-8-7	-1111	-	-	-1110			
				8-7	-1111		

+) )

- Machine Nomenclature: #2927 for English, #2928 for French, #2929 for German, #2930 for Japanese, #2931 for Spanish, #2932 for Italian.
- Print Character Set: Required when Basic Card Print (#1421) is ordered. See "Type Catalog" pages for details.  
#2974 Japan #2958 UK  
#2961 Spanish Speaking

**SPECIAL FEATURES**

**Basic Card Print (#1421):** Provides a print station following the punch station. Print mechanism consists of a print chain, 64 hammers, and a card stepping device. **Field Installation:** Not recommended. **Prerequisites:** #8100 or #2707 on 3505 or #4693 on 3125. Also requires #8339 or #5273 or #2861 on 3525.

**Card Read (#1533):** Provides an optical hole-sensing station ahead of the punch station. Permits cards to be read in EBCDIC (Data Mode 1) or Card Image (Data Mode 2). Cards are read in parallel fashion (row by row) while the previous card is being punched. Data read is fully buffered and can be used to control later operations on the same card such as punching, printing, and stacker selection.

Read-column-eliminate is standard with the feature. Provides the ability, under program control, to suppress the reading of selected card columns. May be used to prevent reading in columns that could cause validity and read checks due to invalid codes or open-punched card scores. See Port-A-Punch under "Card Limitations" for restrictions. **Field Installation:** Yes. **Prerequisites:** #8105 on the 3505 mdl B1 or B2, or #9794 on the 3125.

**Two-Line Katakana Card Print (#2861):** [Japan] Identical in function to Multiline Katakana Card Print (#2862) with the exception that printing is limited to lines 1 and 3 (above the 12 punching row and between rows 12 and 11). Maximum speed in Cards/minute depends upon the machine mdl and the number of lines printed. Speeds are as follows:

**3525 Card Punch (cont'd)**

	P1	P2	P3
1 line	100 cpm	200 cpm	240 cpm
2 lines	100 cpm	133 cpm	171 cpm

**Limitations:** Cannot be installed with #8339, #5273, or #2862.  
**Prerequisites:** #1421. **Field Installation:** Yes.

**Multiline Katakana Card Print (#2862):** [Japan] This feature is similar to the Latin-based Multiline Card Print feature (#5273) except that a 127-graphic set (including space) is provided. See "Type Catalog" pages for detailed information. Maximum speed, in cards/minute when printing, is dependent upon the machine mdl, the average number of lines printed, and the location of the printed lines. Typical speeds are as follows:

	P1	P2	P3
1 Line	100 cpm	200 cpm	240 cpm
2 Lines	100 cpm	133 cpm	171 cpm
3 Lines	67 cpm	100 cpm	109 cpm
4 Lines	57 cpm	89 cpm	92 cpm
6 Lines	45 cpm	62 cpm	67 cpm
10 Lines	33 cpm	42 cpm	43 cpm
25 Lines	17 cpm	18 cpm	18 cpm

**Limitations:** Cannot be installed with #8339, 5373, or #2861.  
**Prerequisites:** #1421. **Field Installation:** Yes.

**Multiline Card Print (#5273):** Provides the ability to print, under program control, on any or all of 25 printing lines on the card. Each print line is 64 characters long and print locations are identical to that of the 2560 MFCM. Maximum speed, in cards/minute, when printing, is dependent upon the machine mdl, the average number of lines printed and the location of the printed lines. Typical speeds are as follows:

	P1	P2	P3
1 Line	100 cpm	200 cpm	300 cpm
2 Lines	100 cpm	200 cpm	240 cpm
3 Lines	67 cpm	133 cpm	150 cpm
4 Lines	67 cpm	114 cpm	133 cpm
6 lines	57 cpm	89 cpm	100 cpm
10 Lines	44 cpm	62 cpm	67 cpm
25 Lines	24 cpm	29 cpm	30 cpm

**Limitations:** Cannot be installed with #8339or #2862. **Field Installation:** Yes. **Prerequisites:** #1421. Also see "Specify" above for specifying the desired character set.

**Two-Line Card Print (#8339):** Identical in function to Multiline Card Print (#5273) with the exception that printing is limited to lines 1 and 3 (above the 12 punching row and between rows 12 and 11). Maximum speed in cards/minute, when printing, depends upon the machine mdl only. Speeds are as follows:

	P1	P2	P3
1 line	100 cpm	200 cpm	300 cpm
2 lines	100 cpm	200 cpm	300 cpm

**Limitations:** Cannot be installed with #5273or #2862. **Field Installation:** Yes. **Prerequisites:** #1421. Also see "Specify" above for specifying the desired character set.

**MODEL CONVERSIONS**

Field installable.

**ACCESSORIES** (None)

**SUPPLIES** (None)

## 3601 FINANCE COMMUNICATION CONTROLLER

THE 3601 IS NO LONGER AVAILABLE

### PURPOSE

A programmable controller for attachment of 3600 Finance Communication System terminals to

S/34 or S/36 (using the appropriate licensed programs), S/3 model 15 processors or to S/370, 303X, 308X, 3090 or 4300 processors using appropriate virtual storage system control programs; or for attachment of certain 4700 Finance Communication System terminals to S/370, 303X, 308X, 3090 or 4300 processors using appropriate virtual storage system control programs, a 3602 Finance Communication Controller, S/34 or S/36 (using the appropriate licensed programs, or an 8100 Information System using DPPX licensed programs.

Attachment to S/34 is via SDLC transmission over various common carrier- or user-owned facilities.

Attachment to S/3 model 15 is via Binary Synchronous Communications (BSC) - see 3601/3602 RPQ 8K0598 and 8K0623 and 5415 RPQ S40156.

S/370, 303X, 308X, 3090, 4331, 4341, 4361 or 4381 processor attachment is via a 3704, 3705, or 3725 Communications Controller using synchronous data link control (SDLC) transmission over various common carrier or user-owned transmission facilities. Attachment is also possible via the Communications Adapter feature on a 4331 or 4361. See M 4331 or 4361 pages for details.

**Note:** See "Programming" and "SCP" pages for attachment capability.

8100 Information System attachment is via the 8130, 8140 or 8101 units using SDLC transmission protocols over various common carrier or nonswitched transmission facilities. Attachment to a System/34 or System/36 is via communication adapter using SDLC transmission protocol over various common carrier facilities. Attachment to a 3602 is via the Fan-Out Communication Feature. See M3602 pages for details.

### MODELS

(NO LONGER AVAILABLE)

**Model 1 001:** A programmable controller with a diskette drive which accommodates 1-sided removable diskettes, a maximum of six loops and a maximum of 56K bytes of user programmable storage.

Remote terminal attachments\* are available.

**Note:** Mdl 1 not for S/34 or S/3.

**Model 2A A02:** A programmable controller with a diskette drive which accommodates 1-sided removable diskettes, a maximum of three loops, and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments\* are available.

**Model 2B B02:** A programmable controller with a diskette drive which accommodates 1- or 2-sided removable diskettes, a maximum of three loops, and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments\* are available.

**Model 3A A03:** A programmable controller with a maximum of two diskette drives which accommodates 1-sided removable diskettes, a maximum of six loops, and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments\* and a Local device cluster attachment are available.

**Model 3B B03:** A programmable controller with a maximum of two diskette drive which accommodates 1- or 2-sided removable diskettes, a maximum of six loops and a maximum of 120K bytes of user programmable storage.

Remote terminal attachments\* and a Local cluster attachment are available.

\* Remote terminal attachments can be achieved on total number of loops indicated by one or a combination of the following as applicable:

Device or Feature	Device or Feat. #	3601				
		1	2A	2B	3A	3B
1200 bps Loop						
Int Modem	#8001	5	-	-	5	5
Terminal						
Attach Unit	3603-2,3	6	3	3	6	6
CCITT Interface	RPQ	5	2	2	5	5

**Prerequisites:** Communications Controller equipped with appropriate features (see M3704, 3705, 3725 or 4331 pages for Communications Adapter feature #1601 on the 4331 Processor), or via an 8100 Information System equipped with appropriate features (see M8130, 8140 and 8101 pages), or via S/34 or S/36 with appropriate features (see M5340, 5360 or 5362 pages).

### HIGHLIGHTS

Controls all the functions of 3600 Finance Communication System terminals. Controls data transmission between those terminals and the central processing site. Four SDLC Communications features are available, one of which is required for transmission to and from the Host. An SDLC Communications feature at speeds from 1200 bps to 4800 bps or an SDLC Communications (mdl 3A or 3B for System/34 or System/3) feature at speeds from 1200 bps to 9600 bps can be selected. Besides host link speed differences, the SDLC feature to 9600 bps allows a maximum controller aggregate bps rate of 12,000 bps for the loops independent of the host link speed. See "Communications Features". For S/34 and S/3, for Binary Synchronous Communications (BSC) - see 3601/3602 RPQs 8K0598 and 8K0623.

**Mdl 1:** Contains approximately 24K bytes of programmable storage. Four additional increments of 8K bytes of programmable storage (for a total of 56K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment. See Add'l Storage Feature (#1005).

**Mdls 2A, 2B, 3A and 3B:** Contain approximately 24K bytes of programmable storage. Six additional increments of 16K bytes or three increments of 32 bytes of programmable storage (for a total of 120K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment. (See Add'l Storage Feature, #1006 or #1007.) For S/34 or S/3, specify #9591 for Control Storage, specify #9592 for User-Programmable Storage.

**Mdls 1, 2A and 3A:** House a direct access diskette drive with a 1-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). The mdl 3A allows the attachment of two 1-sided diskette drives.

**Mdls 2B and 3B:** House a direct access diskette drive with a 2-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). The mdl 3B allows the attachment of two 2-sided diskette drives.

All 3600 system terminals are attached by loops which operate at speeds of 1200, 2400 or 4800 bps for locally attached terminals and at 1200 and 2400 bps for remotely attached terminals (for the 3601 mdl 1, the speeds are 600 or 1200 bps). The base unit provides one loop. Two additional loops are available on mdls 2A and 2B while five additional loops are available on mdls 3A and 3B. 1200 bps loop integrated modems are available on mdls 1, 3A and 3B only. See "Special Features"

**Note:** Either one or two 4800 loops per 3601 may be specified.

The device cluster adapter feature may be attached to the 3601 mdls 3A and 3B.

For the S/34 and S/3:

Communication between the controller and the host may be through an external modem with interface (#3701), or 1200 bps Integrated Modem (#5500). See "Modems" and "Special Features" below. Each 3601 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601s attached to the line (one 3601 transmitting while the other receives).

For attachment to System/3 mdl 15 - see 3601/3602 RPQs 8K0598 and 8K0623 and 5415 RPQ S40156.

Can be programmed to operate independently when the CPU is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the CPU. A keylock is provided for the removable diskette. One key is provided.

For the 3600 or 4700:

Communication between the 3601 and the 3704, 3705, 3725, or the Communications Adapter (#1601) feature on the 4331 Processor or 8130, 8140, 8101 may be either through the 1200 bps Integrated Modem (#5500) on the 3601 or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656) or through an external modem using the interface (#3701) on the 3601 at speeds up to 9600 bps. Local attachment can be made to a 3704, 3705, or 3725 via its local attachment feature using #3701 on the 3601 at 1200 or 2400 bps. Local attachment can be made to a 4331 via its local attachment feature using #3701 on the 3601 at 1200, 2400, 4800 or 9600 bps. See "Modems" and "Special Features" below. Local attachment to a controlling 3602 at 9600 bps is via its Fan Out Communication Adapter Feature (#1551). Each 3601 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601s attached to the line, one 3601 transmitting while the other receives.

Can be programmed to operate independently when the S/370, 303X, 308X, 3090, 4300 Processor, controlling 3602, or 8100 Information System is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the S/370, 303X, 308X, 3090 or 4300 Processor, controlling 3602, or 8100 Information System.

A keylock is provided for the removable diskette. One key is provided.

**Transmission:** The 3601 operates over common carrier-provided or equivalent customer-owned communications facilities. For information concerning these facilities, see M2700 pages.

**Modems:** External modems operating at speeds up to 9600 bps may be used with SDLC features.

Modem	Speed (bps)	Facility
3863	2400	Switched or nonswitched voice-grade lines
3868-1	2400	Nonswitched voice-grade line
3864	4800	Switched or nonswitched voice-grade lines
3868-2	4800	Nonswitched voice-grade

		line
3865	9600	Nonswitched voice-grade line
3868-3,4	9600	Nonswitched voice-grade line
3872	2400	Switched or nonswitched voice-grade lines
3976-3	1200	Nonswitched voice grade lines
5979		
L11/L12	9600	Limited distance COAM line

Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

**Note:** Switched line operation is not supported by the 3601/3602 integrated 1200 bps modem.

**Publications:** GC20-0370 -- IBM S/370 Bibliography and GC27-0001 -- IBM 3600 Finance Communication System, System Summary.

## SPECIFY

### Power (AC, 1-phase):

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	without plug #9901
123.5V	#2811	115V	Locking Plug #9880
220V	#2813	115V	Non-locking plug #9881
235V	#2814		

Field Installation: Not recommended

### Machine Nomenclature:

Canadian	French	#2935	Italian	#2932
English		#2927	Japanese	#2930
French		#2928	Spanish	#2931
German		#2929		

Field Installation: Not recommended.

### Controller Designation: Media distribution of Controller Data. Specify #9491 to identify the initial 3601 or 3602 ordered for use with a host system location, or specify #9492 to identify additional 3601s per host system.

If #9491 is specified for the 3601, specify: #9494 if there is no 3614/3624 with a first position designator attached to any 3601 on the same host system, or ... #9493 if there is a 3614, with a first position designator and #9002, attached to any 3601 on the same host system, and/or ... #9495 if there is a 3614 with a first position designation and #9001 or a 3624 with a first position designator attached to any 3600 Controller on the same host system or if encryption capability via the Data Encryption Standard (DES), is desired on any 3600 Controller in the system. See 3614 Host Attachment Designation under "Specify" for the 3614, or Controller-Data Designation under "Specify" for the 3624.

If #9491 is specified, select the specify number of the desired media.

#9412	9/800 Magnetic Tape
#9413	9/1600 Magnetic Tape
#9414	9/6250 Magnetic Tape

If magnetic tape is not available on designated CPU, then select one of the following media. (DOS/VS users only)

#9431	80-Column Cards
#9432	96-Column Cards

If card or tape inputs are not available at the host location, contact IBM.

When feature #9491 is specified, additional shipping information is required.

Supplementary Specifications (via MES entry) are to be entered exactly as follows to indicate shipping address of the HOST SYSTEM LOCATION.

Line 1 -- IBM Programming Support Representative (PSR)  
Line 2 -- C/O (Name of customer)  
Line 3 -- Street Address (or P.O. Box)  
Line 4 -- City,  
Country, Postal Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered with #9491. Whenever controller data is updated by an EC, it will be shipped to the most current TPC address.

Caution: Specify code #9491 is used to provide Controller Data Media for only the initial 3601 or 3602 attached to a host system location. Do not specify #9491 for more than one 3601 or 3602 per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards to the host system location.

- Cables: See "Accessories" for ordering instructions. Also see "Installation Manual - Physical Planning", GA27-2766.
- If ordering a 3614 or 3624 with 1st position designator (see Host Attachment Designation under "Specify" for the 3614, or Controller-Data Designator under "Specify" for the 3624) to be added to any existing 3601, an MES order transaction should be used against the initial controller (3601 or 3602 with #9491 and #9494) requesting to delete #9494 and add #9493 and/or #9495 for the initial controller.

Refer to IBM for further explanation of these specify codes and their use when (1) ordering a loop-attached 3614 in a network where no 3614s are previously attached, and (2) field installation of #9001 on a loop-attached system.

If all installed or on order 3614s or 3624s for loop attachment to the 3601 are removed or cancelled, an MES order transaction should be used against the initial controller (3601 or 3602 with #9491 and #9493 and/or #9495 requesting to delete #9493 and/or #9495 and add #9494 for the initial controller.

**Note:** The following specify features are field installable: #9412, #9413, #9414, #9431, #9432, #9491, #9492, #9493, #9494, #9495.

## SPECIAL FEATURES

### Non-Communications Features

**Add'l Storage Feature (#1005):** (Mdl 1) Provides an additional 8,192 bytes of control storage for device attachment or an additional 8,192 bytes of user-programmable storage. Specify: #9581 for Control Storage for Device Attachment. Any combination of device types: 3603, 3604, 3606, 3608, 3610, 3611, 3612, 3614, 3615, 3616, 3618, 4704 mdl 1, 4710, 4720, , 4723 and/or 3624 may be attached. Some combinations will require an optional 8,192 bytes of control storage provided by the use of feature #1005. To determine if #1005 is required, refer to the "Device Attachment Table - A" below. Calculate the sum of the attachment factors for the combination of devices to be attached. Add the attachment factor one time only for each device type. If the attachment factor sum is 3 or less, feature #1005 and #9581 are not required. If the attachment factor sum is greater than 3 but does not exceed 11, #1005 and #9581 are required. If the sum is greater than 11, but does not exceed 14, two #1005s and two #9581s are required. An attachment factor of greater than 14 is not allowed.

**Note:** Device Attachment table A is applicable to Controller data EC levels prior to EC749167.

Device Attachment Table - A

Device Type/ Feature/Function	Attachment Factor
3604, 4704 mdl 1	0
Mag. Stripe Encoder- Reader (#4905/#4906)	0.6
3606	3.0
3608	5.8
3610, 3611 and/or 3612	2.4
3614 (with AET only)	2.2
3618	3.0

If additional function is required, or Controller data EC749167 or later is installed, utilize Device Attachment Table - B to determine if #1005 is required. Calculate the sum of the attachment factors for the combination of devices or function required. Add the attachment factor one time only for each device type. If the attachment factor sum is 2 or less, neither #1005 nor #9581 is required. If the attachment factor sum is greater than two but does not exceed 10, #1005 and #9581 are required. If the sum is greater than 10, but does not exceed 14, two #1005s and two #9581s are required. An attachment factor of greater than 14 is not allowed.

Device Attachment Table - B

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section (See "Attachment Factor Functions".)

Device Type/ Feature/Function	Attachment Factor
3603 or 3604 mdls 1-6, 4704 mdl 1	0
SDLC (#4501 or #4502)	0.7
Multiple Block I/O - Diskette	3.0
3614 or 3624 (Note 1)	1.2
3616, 4710, 4720 Part 1 (Note 5,6)	0.5
Optional Instruction Locator	0.3
Instruction Enhancements	1.7
Address Sharing (Note 5,8,9)	0.6
Secondary Logical Unit (LU) Assignment	0.5
3606 (Note 8,9)	2.4
LSEK (Note 2)	1.8
Translate Instruction (LRT) (Note 2)	1.2
3270/3600 Datastream Mapping	8.0
Extended 3270/3600 Keyboard Mapping (Note 7)	1.5
Data Decompression/ Decompression (Note 2)	1.2
Data Compression/ Compaction (Note 2)	1.6
SCRPAD Instruction (Note 2)	1.7
Extended LLOAD Instruction	0.3
INTMR Instruction (Note 2)	1.0
Data Encryption Standard (DES) (Note 1)	1.5
Alternate Encryption Technique (AET) (Note 1)	1.0
Priority Dispatching (LCHAP) (Note 2)	0.3
Data Sequencing	1.6
Extended Statistical Counter Recording (Note 2)	1.3
3618	3.0
3615	3.2
3616, 4710, 4720 Part 2	

(Notes 5,6)	4.0
3610, 3611 and/or 3612	
(Note 3)	2.6
3608 Printer (Note 9)	2.8
Mag Stripe Encoder-Reader	
(#4905/#4906) (Note 4)	0.7
Set Diskette	0.9
3604 mdl 7	0.5
4723 Doc Processor (Note 5)	3.6

Notes:

- Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.
- The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.
- Any 3610, 3611 and 3612 combination constitutes one device type.
- The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.
- Address sharing must be included if a 3616, 4704 mdl 1, 4710, or 4720 or 4723 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.
- Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included when any one of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.
- 3270/3600 Datastream Mapping must be included if the Extended 3270/3600 Keyboard Mapping is used.
- Address sharing must be included if a 3606 is used.
- Address sharing must be included if a 3608 is used. The 3606 must also be included only once to utilize both the 3608 Printer and keyboard/display.

Maximum: For #1005 with #9581 -- Two. Field Installation: Yes. Specify: #9581 for user-programmable storage Add'l Storage Feature (#1005) provides an additional 8,192 bytes of user-programmable storage. Maximum: For #1005 with #9582 -- Four. Field Installation: Yes.

**Add'l Storage (#1006):** Provides an additional 16,384 bytes of control storage for device attachment (mdls 2A, 2B, 3A and 3B only); or an additional 16,384 bytes of user-programmable storage (mdls 2A, 2B, 3A and 3B only). This additional storage can be used for the following four purposes:

- User-Programmable Storage,
- User-Programmable Storage Expansion,
- Control Storage, or
- Control Storage Expansion.

See below for description and limitations. Specify: #9591 for Control Storage, or #9592 for user-programmable storage.

**Add'l Storage (#1007):** (Mdls 2, 2B, 3A, 3B) Provides an additional 32,768 bytes of user-programmable storage. This additional storage can be used for (1) User-programmable storage, or (2) User-programmable storage expansion. See below for description and limitations. Specify: #9602.

- User-Programmable Storage: Used for configuration data and application programs.  
  
Feature #1006, Specify #9592 - Provides an additional 16,384 bytes of user-programmable storage. Maximum: For #1006 with #9592 - Two. Field Installation: Yes.  
  
Feature #1007, Specify #9602 - Provides an additional 32,768 bytes of user-programmable storage. Maximum: For #1007

with #9602 - One. Field Installation: Yes. Prerequisites: On controllers shipped prior to EC 745887, #6501 is required.

- User Programmable Storage Expansion: (Mdls 2A, 2B, 3A, 3B) Used in addition to two #1006 and two #9592 increments or one #1007 and one #9602 increment of user-programmable storage, described above, for the instruction sections of application programs and a limited amount of configuration data and application program constants. Most configuration data and application program constants cannot reside in expanded user-programmable storage.

Feature #1006, Specify #9592 - Provides an additional 16,384 bytes of user-programmable storage. Maximum: (For user-programmable storage plus user-programmable storage expansion): For #1006 with #9592 specified and with Storage Expansion Features (#6501) - six. Prerequisites: If more than two Add'l Storage Features (#1006) with #9592 are ordered, #6501 is required. Field Installation: Yes.

Feature #1007, Specify #9602 - Provides an additional 32,768 bytes of User Programmable Storage. Maximum: (for user-programmable storage plus user-programmable storage expansion) For #1007 with #9602 with Storage Expansion Feature (#6501) - three. Field Installation: Yes. Prerequisites: If more than one Add'l Storage Feature (#1007 with #9602) are ordered, or if in conjunction with any Add'l Storage Feature (#1006 with #9592), then #6501 is required.

- Control Storage: Used for attachment of any combination of device types/functions/features which have associated attachment factors. See "Device Attachment Table - C" below. Some combinations of device types can be accommodated with no further increments of control storage, while other combinations require additional increments of control storage.

Feature #1006, Specify #9591 (Mdls 2A, 2B, 3A, 3B) - Provides one increment of 16,384 bytes of Control Storage for device attachment.

Two additional increments, for a total of 3 are available with Control Storage Expansion (see below). To determine whether and how many control storage increments (#1006 with #9591) are required, refer to "Device Attachment Table - C" below. Calculate the sum of the attachment factors for the combination of devices and/or functions required. Add the attachment factor one time only for each device type, feature or function. If the attachment factor sum is 10 or less, feature (#1006 with #9591) is not required. If the attachment factor sum is greater than 10, feature (#1006 with #9591) is required. An attachment sum greater than 22 is not allowed in this base attachment factor calculation. Maximum (for control storage): For #1006 with #9591 -- One. Field Installation: Yes.

- Control Storage Expansion (CSE): (Mdls 2A, 2B, 3A, 3B) Feature #1006 with #9591. Provides a greater attachment factor capability for certain features or devices which require an attachment factor. CSE supplements the base attachment factor limit of 22 by providing second and third increments of additional storage. An additional attachment factor capability of 12 can be obtained by utilizing the second increment of #1006 with #9591 or 28 by utilizing the second and third increments of #1006 with #9591. Only the attachment factors associated with certain device types, features, or functions can be applied against this expanded attachment factor capability. (See "Device Attachment Table - C" below.)

While Control Storage Expansion provides additional attachment factor capability, the CSE attachment factor must be considered separately from the base attachment factor calculation. Specifically, the attachment factor for a given device or feature must be allocated against either the base or the expanded attachment factor but not both. Maximum (for Control Storage plus Control Storage Expansion): For #1006 with #9591 specified and with Storage Expansion Feature (#6501) -- Three. Field Installation: Yes. Prerequisites: If more than one #1006 with #9591 is ordered, then #6501 is required. Limitations: The maximum number of #1006s (whatever the combination of #9591 and #9592), is nine for controllers with serial numbers of 9770001 or higher, or if the controller is a recondi-

tioned unit incorporating EC 745887. For units with lower serial numbers, without EC 745887, the maximum number of #1006s is seven. The maximum number of #1006s commencing with units with EC 745887 is nine.

The maximum number of #1007s is three.

The maximum number of #1007 plus #1006 (whatever the combination of #9602, #9591, or #9592) for controllers shipped prior to 9770001 without EC 745887 is:

	Feature Code #1007	+	Feature Code #1006
Qty	3	+	1
Qty	2	+	3
Qty	1	+	5
Qty	0	+	7

The maximum number of #1007 plus #1006 for controllers with serial numbers 9770001 or higher, or reconditioned units with EC 745887 is:

	Feature Code #1007	+	Feature Code #1006
Qty	3	+	3
Qty	2	+	5
Qty	1	+	7
Qty	0	+	9

Device Attachment Table - C

In the following table, attachment factors in the column labeled "Base" are applicable to the base attachment factor calculation only. Attachment factors in the column labeled "Base or Expanded" are applicable to either the base or expanded attachment factor calculation.

The 3600 controller loads support for devices/features into control storage in the sequence indicated by the following table. Those RPQs with an attachment factor are also loaded in a prescribed sequence, as indicated in the IBM 3600 Finance Communication System Configurator (GA27-2762). The controller will always attempt to load each device, feature or RPQ into base control storage. If a device, feature or RPQ is encountered that will not fit into base control storage and it is applicable to extend control storage, the controller will attempt to load it into expanded control storage. The above algorithm must be used to determine control storage requirements.

Refer to the 3600 Finance Communication System Configurator, GA27-2762 for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section: See "Attachment Factor Functions".

Device Type/ Feature/Function	Attachment Factor	Base Or Expanded
3603 or 3604 mdls		
1-6, 4704 mdl 1	0	
SDLC (#4501 or #4502)	0.7	
X.21 Adapter, Switched (#5656)	5.0	
X.21 Adapter, Switched (#5656)		
extended diagnostic	6.0	
Multiple Block		

I/O-Diskette	3.0
3614 or 3624 (Note 1)	1.2
3616, 4710, 4720	
Part 1 (Notes 5,6)	0.5
Optional Instruction	
Locator	0.3
Instruction Enhancements	1.7
Address Sharing	
(Notes 5,12,13)	0.6
Secondary Logical Unit	
(LU) Assignment	0.5
3606 (Note 12,13)	2.4
Device Cluster Adapter	
(Notes 8,9)	5.0
3278-2 Attachment	
(Note 9)	4.5
LSECKP Instruction	
(Note 2)	1.8
Translate Instruction	
(LTRT) (Note 2)	1.2
3270/3600 Datastream	
Mapping	8.0
Extended 3270/3600	
Keyboard Mapping	1.5
(Note 7)	
Data Decompression/	
Decompression (Note 2)	1.2
Data Compression/	
Compaction	1.6
Extended LLOAD	
Instruction	0.3
SCRPAD Instruction	
(Note 2)	1.7
INTMR Instruction	
(Note 2)	1.0
Data Encryption Standard	
(DES) (Note 1)	1.5
Alternate Encryption	
Technique (AET) (Note 1)	1.0
Priority Dispatching	
(LCHAP) (Note 2)	0.3
Data Sequencing	1.6
Extended Statistical	
Counter Recording	1.3
(Note 2)	
Extended Diskette Access	
Method (EDAM) Base	5.5
EDAM Allocate/Deallocate	
(LDKT Instruction) (Note 10)	1.7
EDAM Temporary File	
Support (Note 11)	1.5
3616, 4710, 4720	
Part 2, 3262/3287/3289	
Part 1 (Note 5,6,8)	3.0
3262/3287/3289	
Part 2 (Note 8)	1.5
3618	3.0
3615	3.2
3610, 3611 and/or	
3612 (Note 3)	2.6
3608 Printer (Note 12)	2.8
Mag Stripe Encoder-Reader	
(#4905/#4906) (Note 4)	0.7
Set Diskette	0.9
3604 mdl 7	0.5
4723 Doc Processor	
(Note 5)	3.6

Notes:

- Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.

2. The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.
3. Any 3610, 3611 and 3612 combination constitutes one device type.
4. The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.
5. Address sharing must be included if a 3616, 4704 mdl 1, 4710, or 4720 or 4723 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.
6. Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included if one of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.
7. 3270/3600 Datastream Mapping must be concluded if extended 3270/3600 Keyboard Mapping is used.
8. The Device Cluster Adapter, 3262/3287/3289 Part 1, and 3287/3289 Part 2 must be included if a 3262, 3287 or a 3289 is used.  
  
The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3262, 3278-2, 3287 and 3289 is used.  
  
The attachment factor for 3616, 4710, 4720 Part 2 and 3262/3287/3289 Part 1 need be included only once if more than one of these device types is used.
9. Both the Device Cluster Adapter and 3278-2 Attachment must be included if a 3278-2 is used.  
  
The attachment factor for the Device Cluster Adapter need be included only once if any combination of 3262, 3278-2, 3287 and 3289 is used.
10. The EDAM Base must be included if the Allocate/Deallocate function is used.
11. The EDAM Base must be included if EDAM Temporary File Support is used.
12. Address sharing must be included if a 3606 is used.
13. Address sharing must be included if a 3608 is used. The 3606 must also be included only once to utilize both the 3608 Printer and keyboard/display.

**Auxiliary Diskette Drive .25 Megabyte (#1025):** (Mdl 3A) Provides approximately 280,000 bytes of additional diskette storage via two diskette drives. No area of the diskette to be mounted in the auxiliary (or secondary) drive will be reserved for the control program. Maximum: One. Field Installation: Yes.

**Auxiliary Diskette Drive .5 Megabyte (#1035):** (Mdl 3B) Provides approximately 560,000 bytes of additional diskette storage via two diskette drives. No area of the diskette to be mounted in the auxiliary (or secondary) drive will be reserved for the control program. Maximum: One. Field Installation: Yes.

**Note:** Support for #1025 and #1035 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDKT instruction) and EDAM Temporary File Support. Refer to "Device Attachment Table - C" and "Attachment Factor Functions" section.

This feature requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the installation of this feature.

**Device Cluster Adapter (#3101):** (Mdls 3A, 3B) Provides for the local attachment of a mix of 3278-2 display stations, 3287 printers, 3262-3, 13 Printers and 3289-1, 2 printers up to a maximum of eight

devices. When attaching the 3278-2 display station to the device cluster adapter, no-charge 3278 RPQ 8K0880 is required. Limitations: Maximum distance from controller to terminal is 610m (2,000 ft) using shielded twisted pair cable or 1,500m (4,920 ft) using coaxial cable. When the device cluster adapter is installed, Loop number four is no longer available. The maximum number of loops available on the 3601-3 is therefore reduced to five. Maximum: One. Field Installation: Yes.

**Loop Feature, Add'l (#4735):** Provides the ability to attach additional 3600 Finance Communication System terminals. Limitations: A maximum of two loops (including the provided local loop) operating at 4800 bps per 3601 are allowed when one of the SDLC communication features (#4501 or #4502) are specified. Otherwise, the maximum is one loop operating at 4800 bps (including the provided local loop). Loop Integrated Modem (#8001) cannot be installed on mdls 2A and 2B.

**Note:** The sum of the speeds of all loops in bits per second (bps) plus the speed of the SDLC link (#6301 or #6302) in bps cannot exceed 12,000 bps. When SDLC feature (#4501 or #4502) is installed, the sum of all loops cannot exceed 12,000 bps (do not use the host link speed).

Maximum: Two per mdls 2A and 2B. Five per mdls 1, 3A and 3B. Field Installation: Yes. Prerequisites: For each loop with any remotely attached terminals, 1200 bps Loop Integrated Modem (#8001) on a terminal or a 3603 is required.

**600 bps Loop Integrated Modem (#5450):** (Mdl 1) An integrated modem for communication with remotely located 3600 Finance Communication System terminals. Operates in a full-duplex mode at 600 bps over 2-wire, point-to-point, normal quality, voice grade lines. Maximum: One per Add'l Loop Feature (#4735). Field Installation: Yes. Prerequisites: #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with #5450, or a 3614 consumer Transaction Facility with #5450 as the first attached remote unit in each physical (geographic) location.)

**Storage Expansion Feature (#6501):** (Mdls 2A, 2B, 3A, 3B) Provides capability of (1) expanding user-programmable storage (#1006) with #9592 or #1007 with #9602 beyond 56K bytes, and/or (2) adding additional increments of #1006 with #9591, beyond 16K bytes. Limitations: If IR 4 and Controller Data ECs 745122 and 745123 are utilized, the controller will work properly with the Storage Expansion Feature (#6501) installed, but Control Storage Expansion cannot be utilized. If releases earlier than IR 4 and Controller Data ECs 745122 and 745123 are utilized, neither the Storage Expansion Feature (#6501) nor more than one Add'l Storage Feature (#1006) with #9591 should be installed. Maximum: One. Field Installation: Yes.

**Note:** #6501 is required when more than one Add'l Storage Features (#1006) with #9592 and/or when more than one Add'l Storage Feature (#1006) with #9591 are ordered. #6501 is required when more than one Add'l Storage Feature (#1006 with #9591), or more than two Add'l User-Programmable Storage Features (#1006 with #9592), or more than one Add'l Storage Feature or Add'l Storage Feature (#1007 with #9602) with User-Programmable Storage Feature (#1006 with #9592). Prerequisites: #6501 is a prerequisite for any #1007 on mdls 2A, 2B, 3A and 3B shipped prior to EC 745887.

## COMMUNICATIONS FEATURES

Each 3601 must be equipped with one of the following SDLC features and either the CCITT Interface (#3701) or the 1200 bps Integrated Modem (#5500) or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656) for communication with the host processor.

**CCITT Interface (#3701):** Provides the appropriate cables and interface logic necessary to attach an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages for communications to the host processor through the 3704, 3705, 3725, or the communications Adapter (#1601) feature on the 4331 Processor, or for communications to an 8100 Information System or for local attachment to the controlling 3602, 3704, 3705, 3725, or 4331 without requiring mod-

ems. See M3602, 3704, 3705, 3725, or 4331 pages for details. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. Limitations: Cannot be installed with a 1200 bps Integrated Modem (#5500) or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656). Maximum: One. Field Installation: Yes. Prerequisites: #6301 or #4501 ... or #6302 or #4502.

**SDLC Communications Feature With Business Machine Clocking (#4501):** Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500), or any 1200 bps external modem which does not have internal clocking at 1200 bps or for local attachment to a 3704, 3705, or 3725 Communications Controller (#4716) at 1200 or 2400 bps. The SDLC link speed of this feature need not be included when calculating the sum of the speeds not to exceed the aggregate bps rate of 12,000 bps. Limitations: Cannot be installed with #6301, #6302 or #4502. Maximum: One. Field Installation: Yes.

**SDLC Communications Feature Without Business Machine Clocking (#4502):** Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps. Also required for attachment to a controlling 3602 or for local attachment to a 4331 Processor (#4801) at 1200, 2400, 4800, or 9600 bps. The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. Limitations: Cannot be installed with #6301, #6302 or #4501. Maximum: One. Field Installation: Yes. Prerequisites: #3701, #5655 or #5656.

**1200 bps Integrated Modem (#5500):** An integrated modem for operation at 1200 bps over nonswitched half-duplex or duplex voice grade lines for communication to the processor through the 3704, 3705, 3725, or the Communications Adapter (#1601) feature on the 4331 Processor, or for communications to an 8100 Information System. Limitations: Cannot be installed with Interface (#3701) or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656). Maximum: One. Field Installation: Yes. Prerequisites: #4501 or #6301. Specify: #9651 for 4-wire strapping, or #9652 for 2-wire strapping.

**(Japan only > X.21 Adapter For Nonswitched Networks (#5655):** This feature provides an interface and 6 meter cable for attachment to an X.21 native nonswitched network with no changes to existing SNA/SDLC procedures for controlling nonswitched lines. This feature will operate only with SNA/SDLC procedures. It enables the user to connect DCEs whose electrical characteristics match those described in CCITT Recommendation X.21 for nonswitched point-to-point and multipoint communication. The network establishes the data rate and supplies the clock. Speeds supported include 2400, 4800 and 9600 bps. Limitations: Cannot be installed with #5500, #3701 or #5656. Available only on controllers with serial numbers 9770001 or higher or if the controller is a reconditioned unit incorporating EC 745887. Prerequisites: #6302 or #4502. <)

**X.21 Adapter For Switched Networks (#5656):** [AFE(Japan only <)] An interface adapter and 6m cable for attachment to the X.21 Switched Network. SDLC Communications at speeds of 2400, 4800 and 9600 bps are supported. Limitations: Cannot be installed with CCITT Interface (#3701), 1200 bps Integrated Modem (#5500) or X.21 Adapter for Nonswitched Networks (#5655). Available only on controllers with serial numbers of 9770001 or higher or if the units is a reconditioned unit incorporating EC 745887. Maximum: One. Field Installation: Yes. Prerequisites: #4502.

**SDLC Communications Feature With Business Machine Clocking (#6301):** Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500), or any 1200 bps external modem which does not have clocking at 1200 bps, or for local attachment to a 3704, 3705, or 3725 Communications Controller (#4716) at 1200 or 2400 bps, or for communications to an 8100 Information System. Limitations: Cannot be installed with #6302, #4501 or #4502. Maximum: One. Field Installation: Yes.

**SDLC Communications Without Business Machine Clocking (#6302):** Required for attachment to communications lines through an external modem which does have internal clocking at speeds up to 4800 bps or for local attachment to a 4331 Processor (#4801) at

1200, 2400 or 4800 bps. Limitations: Cannot be installed with #6301, #4501 or #4502. Maximum: One. Field Installation: Yes. Prerequisites: #3701, #5655 or #5656.

**1200 bps Loop Integrated Modem (#8001):** (Mdl 1, 3A, 3B) An integrated modem for transmission to remotely located 3600 Finance Communication System terminals. Operates at 1200 bps over non-switched normal quality voice grade lines.

**Note:** Several remote loop configuration variations can be realized; e.g., see the "IBM 3600 FCS Configurator", GA27-2762. However regardless of configuration, the interconnecting common carrier facilities are always point-to-point circuits; either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600 "remote loops". The customer should be referred to the configurator or information in the M2 700 pages for definition of the tariffed elements of the remote loop.

Maximum: One per Add'l Loop Feature (#4735). Field Installation: Yes. Prerequisites: #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with #8001 or #8002, a 3614 consumer Transaction Facility with #8001 or a 3603 as the first attached remote unit in each physical (geographic) location.

### MODEL CONVERSIONS

The following model changes are field installable:

	To	2B	3A	3B
From				
2A		x*	x	x*
2B			x	
3A				x*

\* Requires replacement of the diskette storage device. Adequate provision must be made for retaining data contained on the diskette by having the user remove it prior to the start of any conversion. Field Installation: Yes.

### Attachment Factor Functions

- **Data Sequencing:** Allows user application to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.
- **Set Diskette**  
Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.
- **Instruction Enhancements**  
Provides the user application with the following new instructions:
  - **Bit Manipulating**  
Test and Branch (LIFON, LIFOFF) - Provides a test set, and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.
  - **Logical Compare Data Immediate (CCDI)**  
Compares immediate data to data in a specified field.
  - **Move Data Immediate (MVDI)**  
Moves immediate data to a specified field.
  - **Load Data Immediate (LDDI)**  
Loads immediate data into specified register.
  - **SCALE**  
Formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the

monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. SCALE should significantly reduce the number of instruction required to process monetary input.

- Segment Indexing (SETX, TESTX, SETXREG)  
Provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instruction may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference (1) variably displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.
- Branch on Index (BRANX)  
Provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.
- Execute (LEXEC)  
Provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.
- Priority Dispatching  
Provides the ability to specify the order in which 3601/3602 workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.
- Translate  
The LTRT instruction processes an input data stream against user specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).
- Extended Statistical Counter Recording  
Provides the option to enhance statistical counter recording facilities to assist in fault isolation of degraded loop segments. This facility is particularly useful when a loop consists of multiple remote locations.
- Multiple Block I/O - Diskette  
Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than 3 blocks are read or 4 blocks are written.
- 3270/3600 Datastream Mapping  
Provides, via four new 3600 assembler language instructions, 3600 controller assistance in converting 3270 output display data streams into an output data stream processable by 3600 attached devices, and 3604 input data streams into 3270 input data streams. Input and output screen sizes are supported as specified by the application programmer. The 3270 Tab, Clear, PA and PF keys are simulated.
- Extended 3270/3600 Keyboard Mapping  
Provides simulation of the 3270 Insert, Delete, Erase To End Of Field and Erase Input keyboard functions.
- LSEKIP Instruction

Locates a table entry which is "equal to" "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Table may be included in the instruction section of the controller application program, thereby permitting the tables to reside in expanded user programmable storage.

- SCRPAD Instruction  
Provides access to optional global work areas distant from segment storage which may reside in base or expanded user programmable storage.
- Data Compression/Compaction  
This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.
- Data Decompression/Decompaction  
This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.
- Extended Diskette Access Method (EDAM) Base  
Provides the capability to open, access (via the LREAD, LWRITE or REPLACE instructions) and close data sets on the primary or auxiliary diskette drive.
- EDAM Allocate/Deallocate (LDKT Instructions)  
Provides the capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.
- EDAM Temporary File Support  
Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.
- INTMR Instruction  
Permits the collection of elapsed time for events initiated and terminated by a controller application program.
- Extended LLOAD Instruction  
Allows a controller application program to load data overlays into segments other than segment 14.
- Secondary Logical Unit (LU) Assignment  
Allows a controller application program to change the logical unit address associated with a given workstation.

## ACCESSORIES

**Cables:** IBM shielded twisted pair is required for attaching 3600 units. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories. For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation within your country.

Other applicable cable assemblies and associated accessories can be purchased from IBM. See "Physical Planning Manual", GA27-2766 for cable and connector specifications. Specify bulk number, cable assembly number or part number as appropriate. Allow a lead time of 120 days.

Item No.	Description	Length
1563155	Loop Cable	

## MACHINES

4474809	Assembly	609.6m (2,000')
	Cable Assy	
	(3609-2 to	
	Modem)	2.08m (82 in)
1745372	Cable Assy	
	(Loop Repeater	
	to Loop	
	Terminal Box)	7.62m (25 ft)
1745350	Cable Assy	
	(3603 to Leased	
	Lines)	7.62m (25 ft)
	(Canada only>	
1745349	Cable Assy	
	(DDA to 3603)	7.62m (25 ft)
1741656	Cable Assy	
	(joining 2	
	telephone	
	lines)	N/A<)
	(Canada only>	
1745348	Cable Assy	
	(3603 to	
	Loop Terminal	
	Box)	7.62m(25 ft)<)
4400029	Cable Assy	
	(PTT leased	
	line to	
	3603-3	2.08m (82 in)
1142961	Bulk Cable	
	(12 Conductor)	N/A
5252781	Bulk Cable	
	(4 Conductor)	N/A
5252920	Bulk Cable	
	(2 Conductor)	N/A
765294	Conn. Assy	
	(EIA/CCITT)	N/A
5252769	Bulk Cable	
	(2 Conductor)	N/A
5252913	Bulk Cable	
	(4 Conductor)	N/A
1561344	Strain Relief	
1745363	Conductor	
	Assembly (3603)	
5252763	Male Plug	
5252765	Female Plug	
5420242	Mini-Ty (used with 1745363)	

**Locks and Keys:** The 3601 is shipped with two keys. Additional keys may be purchased from IBM. Indicate serial number of lock.

**Loop Repeater (P/N 4400002):** Plugs into the Loop cable and re-drives all signals being transmitted in a 3600 Finance Communication System. Each Loop Repeater contains Loop re-driving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. Prerequisites: An operating 3600 System Local Loop or Remote Subloop. Publications: GC22-0005.

### Customer Responsibilities

The customer may be advised that:

1. The customer is responsible for making certain that the use of the equipment complies with all Country and Local Laws, Regulations, and Ordinances.
2. The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service.

3. The customer is responsible for the set-up of the unit.
4. The customer will determine the failing unit (see "Maintenance" below).
5. The customer is responsible for determining the required number of spares.

### Physical Planning and Setup

Physical planning and setup is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly (P/N 174372), or equivalent. (See IBM 3600 Finance Communication System Installation Manual - Physical Planning, GA27-2766.)

### Spares

The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of Loop Repeaters Installed	Minimum Number of Spares Recommended
100	2

### Warranty

Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventative maintenance recommended by IBM on these units. Maintenance agreements are not available. CE on-site service will not be provided.

### Ordering

Order P/N 4400002.

**Diskettes:** The following diskettes may be obtained by contacting IBM.

Diskette 1 (single-sided) 3601/3602

Byte Format	Part Number
256	2305845
128	2305830

Diskette 2 (double-sided) 3601-2B/3B,  
3602-1A/2A

Byte Format	Part Number
256	2736700
128	1766870

**SUPPLIES (NONE)**

## 3602 FINANCE COMMUNICATION CONTROLLER

[NO LONGER AVAILABLE as of October 1984. Model changes, Features, RPQs and Accessories are available.]

### PURPOSE

A programmable controller for attachment of 3600 Finance Communication System terminals to System/34 and System/3 model 15 processors and for attachment of 3600 Finance Communication System terminals or certain 4700 Finance Communication System terminals and the 3694 Document Processor to S/370, 303X, 308X, 3090 or 4300 processors using appropriate virtual storage system control programs or an 8100 Information System using DPPX licensed programs.

Attachment to System/34 is via SDLC transmission over various common carrier or user-owned facilities.

Attachment to System/3 model 15 is via Binary Synchronous Communications (BSC) - see 3601/3602 RPQs 8K0598 and 8K0623 and 5415 RPQ S40156.

S/370, 303X, 308X, 3090 or 4300 Processor attachment is via a 3704, 3705, or 3725 Communications Controller or the Communications Adapter (#1601) feature on the 4331 Processor using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities. 8100 Information System attachment is via the 8130, 8140 and 8101 units using SDLC transmission protocols over various common carrier or nonswitched transmission facilities.

**Note:** See "Programming" and "SCP" pages for attachment capability.

### MODELS

**Model 1A A01** A large-file programmable controller with a 5.2 meg (floating head) disk, a drive which accommodates 1- or 2-sided removable diskettes, 16K or 32K increments of storage, and a maximum loop capability of eight, of which seven can be remote.

**Model 1B B01** A large-file programmable controller with a 9.3 meg (floating head) disk, a drive which accommodates 1- or 2-sided removable diskettes, 16K or 32K increments of storage, and a maximum loop capability of eight, of which seven can be remote.

**Prerequisites:** Communications with a S/370, 303X, 308X, 3090 or 4300 processor with virtual storage capability via 3704, 3705, or 3725 Communications Controller equipped with appropriate features or the Communications Adapter (#1601) feature on the 4331 Processor (see M3704, 3705, 3725, or 4331 pages) or via an 8100 Information System equipped with appropriate features (see M8130, 8140 and 8101 pages).

### HIGHLIGHTS

Controls all the functions of the 3600 Finance Communication System or certain 4700 Finance Communication System terminals. Controls data transmission between those terminals and the central processing site. Four SDLC Communication features are available, one of which is required for transmission to the host. An SDLC Communications feature at speeds of from 1200 bps to 4800 bps or an SDLC Communications feature at speeds of from 1200 bps to 9600 bps can be selected. Besides host link speed differences, the SDLC feature that is used at 9600 bps allows a maximum controller aggregate bps rate of 12,000 bps for the loops independent of the host link speed ... see "Communication Features". For Binary Synchronous Communications (BSC), see RPQs 8K0598 and 8K0623.

Contains approximately 24K bytes of programmable storage. Six additional increments of 16K bytes or three increments of 32K bytes of programmable storage (for a total of 120K) are available. The amount of programmable storage available for application programming depends upon the attached terminal configuration and user environment ... see Add'l Storage (#1006 or #1007) under "Special Features".

Houses a direct access diskette (contact head) drive with 2-sided removable diskette which provides permanent storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). (Canada only) With Auxiliary Diskette Drive .5MB (#1015), the 3602 permits attachment of two 2-sided diskette drives. +)

Houses a floating head disk storage device for storage of user data. This storage device is not removable except by service personnel. Includes a fixed head feature which will provide eight additional heads with access to disk data on eight tracks ... see Add'l Disk Heads (#1010, #1011) under "Special Features".

All 3600/4700 system terminals (except 4704 mdl 2 and 3) are attached by loops which operate at speeds of 1200, 2400 or 4800 bps for locally attached terminals and at 1200 or 2400 bps for remotely attached terminals. The base unit provides one loop. Seven additional loops are available. Integrated modems are available on both mdl ... see "Special Features". **Note:** Either one or two 4800 bps loops per 3602 may be specified. **Note:** Only one 4800 bps loop per 3602 may be specified for System/3 Host attachment.

(Canada only+)

Can serve as a cluster controller for attachment of the 3600 Controllers, attachment of 3662 or 3287 Printers for full-page high-speed printing or attachment of 3278 mdl 2 Display Stations. +)

Communication between the controller and the 3704, 3705, or 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or 8130, 8140, 8101 may be either through an integrated 1200 bps modem or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656) or through an external modem using Interface (#3701) on the 3602. Local attachment can be made to a 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor via its local attachment feature using #3701 on the 3602 at 1200 or 2400 bps. Local attachment can be made to a 4331 via its local attachment feature using #3701 on the 3602 at 1200, 2400, 4800 or 9600 bps. See "Modems" and "Special Features" below. Each 3602 operates in half-duplex mode. Duplex communication line operations are possible with multiple 3601/3602s attached to the line ... 3602 transmitting while the other receives. For attachment to System/3 mdl 15, see 3601/3602 RPQ 8K0598 and 5415 RPQ S40156.

Can be programmed to operate independently when the processor is unavailable. Capable of controlling all terminal functions, executing arithmetic, and capturing data from the terminals for later transmission to the S/370, 303X, 308X, 3090 or 4300 processor or 8100 Information System.

**Transmission:** The 3602 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

**Modems:** External modems operating speeds up to 9600 bps may be achieved with SDLC feature. External modems operating at up to 4800 bps may be attached when used with SDLC Feature #6301 or #6302. Speeds up to 9600 bps may be achieved with SDLC Feature #4501 or #4502.

Modem	Speed bps	Facility
3863	2400	Switched or nonswitched voice-grade lines
3868-1	2400	Nonswitched voice-grade lines
3864	4800	Switched or nonswitched voice-grade lines
3868-2	4800	Nonswitched voice-grade lines
3865	9600	Nonswitched voice-grade lines
3868-3,4	9600	Nonswitched voice-grade lines
3872	2400	Switched or nonswitched voice-grade lines
3976-3	1200	Nonswitched voice-grade lines
L11/L12	9600	Limited distance COAM line

See M2700 pages for further information. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy.

**Note:** Switched line operation is not supported by the 3601/3602 integrated 1200 bps modem.

**Bibliography:** *IBM System/370 Bibliography*, GC20-0370, and *IBM 3600 Finance Communication System, System Summary*, GC27-0001.

### SPECIFY

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	208V #9902
220V #2813	230V #9904
235V #2814)	

#### Locking Plug

115V #9880  
208V #9884  
230V #9886

#### Non-locking Plug

115V #9881  
208V #9885  
230V #9887

**Field Installation:** Not recommended.

**3602 Finance Communication Controller (cont'd)**

## • Machine Nomenclature:

Canadian French #2935	Italian #2932
English #2927	Japanese #2930
French #2928	Spanish #2931
German #2929	

**Field Installation:** Not recommended.

- Controller Designation: Media distribution of Controller Data. Specify #9491 to identify the initial 3601 or 3602 ordered for use with a host system location, or specify #9492 to identify additional 3602s per host system.

If #9491 is specified for the 3602, specify:

- #9494 if there is no 3614 or 3624 with a first position designator attached to any 3602 on the same host system, or
- #9493 if there is a 3614 with a first position designator and #9002 attached to any 3602 on the same host system, and/or
- #9495 if there is a 3614 with a first position designator and #9001 or a 3624 with a first position designator attached to any 3602 on the same host system; or if encryption capability, via the Data Encryption Standard (DES), is desired in the 3600 Controller.

See 3614 Host Attachment Designation under "Specify" for the 3614.

If #9491 is specified, select the specify number of the desired media.

9/800 Magnetic Tape (#9412)  
9/1600 Magnetic Tape (#9413)  
9/6250 Magnetic Tape (#9414)

If magnetic tape is not available on designated processor, then select one of the following media (DOS/VS users only):

80-Column Cards (#9431)  
96-Column Cards (#9432)

If card or tape inputs are not available at the host location, contact IBM for guidance. When feature #9491 is specified, additional shipping information is required. Supplementary specifications are to be stated exactly as follows to indicate shipping address of the host system location:

Line 1 -- IBM Programming Support Representative (PSR)  
Line 2 -- C/O (Name of customer)  
Line 3 -- Street Address (or P.O. Box)  
Line 4 -- City, Country, Postal Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered with specify #9491. Whenever controller data is updated by an EC, it will be shipped to the most current TPC address.

**Caution:** #9491 is used to provide Controller Data Media for only the initial 3601 or 3602 attached to a host system location. Do not specify #9491 for more than one 3601 or 3602 per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards to the host system location.

- Cables: See "Accessories" for ordering instructions. Also see *Installation Manual-Physical Planning*, GA27-2766.
- If ordering a 3614 or 3624 with first position designator (see Host Attachment Designation under "Specify" for the 3614, or Controller - Data Designation under "Specify" for the 3624) to be added to any existing 3602, an order transaction should be used against the initial Controller (3601 or 3602 with #9491 and #9494 requesting to delete #9494 and add #9493 and/or #9495 for the initial Controller.

If all installed or on order 3614s or 3624s for loop attachment to the 3602 are removed or cancelled,

a WTAAS order transaction should be used against the initial Controller (3601 or 3602 with #9491 and #9493 and/or #9495 requesting to delete #9493 and/or #9495 and add #9494 for the initial controller).

Refer to ZG76-0706 for further explanation of these specify codes and their use when (1) ordering a loop-attached 3614 in a network where no 3614s are previously attached, and (2) field installation of feature #9001 on a loop-attached 3614.

- The following specify codes are field installable: #9412, #9413, #9414, #9431, #9432, #9491, #9492, #9493, #9494, #9495.

**SPECIAL FEATURES**
**NON-COMMUNICATIONS FEATURES**

**Add'l Storage (#1006):** Provides an additional 16,384 bytes of control storage for device attachment or an additional 16,384 bytes of user-programmable storage. Additional storage can be utilized for the following purposes: (1) User-Programmable Storage, (2) User-Programmable Storage Expansion, (3) Control Storage and (4) Control Storage Expansion (see below for description and limitations). **Specify:** #9591 for Control Storage -- #9592 for User-Programmable Storage.

**Add'l Storage (#1007):** Provides an additional 32,768 bytes of User-Programmable Storage. Additional storage can be used for (1) User-Programmable Storage or (2) User-Programmable Storage expansion (see below for description and limitations). **Specify** #9602.

**[1] User-Programmable Storage:** Used for configuration data and application programs.

Feature #1006, specify #9592: Provides an additional 16,384 bytes of User-Programmable Storage. **Maximum:** for #1006 with #9592 -- two. **Field Installation:** Yes.

Feature #1007, specify #9602: Provides an additional 32,768 bytes of User-Programmable Storage. **Maximum:** for #1007 with #9602 -- one. **Field Installation:** Yes.

**[2] User-Programmable Storage Expansion:** Used in addition to two #1006 and two #9592 increments or one #1007 with one #9602 increment of User-Programmable Storage described above, for the instruction sections of application programs, and a limited amount of configuration data and application program constants. Most configuration data and application program constants *CANNOT* reside in expanded user-programmable storage.

Feature #1006, specify #9592: Provides an additional 16,384 bytes of User-Programmable Storage. **Maximum:** (for User-Programmable Storage plus User-Programmable Storage Expansion): For #1006 with #9592 and with Storage Expansion Feature (#6501) -- six. **Prerequisites:** If more than two additional Storage Features (#1006 with #9592) are ordered, #6501 is required. **Field Installation:** Yes.

Feature #1007, specify #9602: Provides an additional 32,768 bytes of User-Programmable Storage. **Maximum:** (for User-Programmable Storage plus User-Programmable Storage Expansion): For #1007 with #9602 and with Storage Expansion Feature (#6501) -- three. **Prerequisites:** If more than one Add'l Storage Feature (#1007 with #9602) is ordered, or if in conjunction with any Add'l Storage Feature (#1006 with #9592), then #6501 is required. **Field Installation:** Yes.

**[3] Control Storage:** Feature #1006, specify #9591. Used for the attachment of any combination of device types/functions/features, which have associated attachment factors (see "Device Attachment Table"). Some combination of device types can be accommodated with no further increments of control storage, while other combinations require additional increments of control storage provided by the use of feature #1006 with #9591. One additional increment of control storage is available without utilizing Control Storage Expansion. (Canada only+ Three +) (Except Canada+ Two +) additional increments, for a total of (Canada only+ four, +) (Except Canada+ three, +) are available with Control Storage Expansion. To determine whether and how many control storage increments (#1006 with #9591), refer to the "Device Attachment Table" (below). Calculate the sum of the attachment factors for the combination of devices or function required. Add the attachment factor one time only for each device type, feature, or function. If the attachment factor sum is 10 or less, feature #1006 or #9591 is not required. If the attachment factor sum is greater than 10, features #1006 and #9591 are required. An attachment factor greater than 22 is not allowed in this base attachment factor calculation.

**[4] Control Storage Expansion (CSE):** Feature #1006, specify #9591. Used to provide a greater attachment factor capability for those features or devices which require an attachment factor. CSE supplements the base attachment factor limit of 22 by providing second, third (Canada only+ and fourth +) increments of Add'l Storage (#1006 with #9591). An additional attachment factor capability of 12 can be obtained by utilizing the second increment of Add'l Storage, or 28 by utilizing the second and third increments (Canada only+ , or 44 by utilizing the second, third and fourth increments +) of Add'l Control Storage. Only the attachment factors associated with certain device types, features, or functions can be applied against this expanded attachment factor capability (see "Device Attachment Table" below). While Control Storage Expansion provides additional attachment factor capability, the

**3602 Finance Communication Controller (cont'd)**

CSE attachment factor must be considered separately from the base attachment factor calculation. Specifically, the Attachment Factor for a given device or feature must be allocated against either the base or the expanded attachment factor but not both. Maximum (for Control Storage plus Control Storage Expansion): For #1006 with #9591 and without #6501 ... one. For #1006 with #9591 and with #6501 ... (Canada only+ four +) (Except Canada+ three +). **Limitations:** The maximum number of #1006s (with any combination of #9591 and #9592) is (Canada only+ ten +) (Except Canada+ nine +). The maximum number of #1007s is three. **Field Installation:** Yes. **Prerequisites:** If more than one Control Storage Feature (#1006 with #9591) is ordered, the Storage Expansion Feature (#6501) is required.

The maximum number of #1007s plus #1006s, whatever the combination of #9602, #9591 or #9592, is:

	Feature Code #1007	+	Feature Code #1006
(Canada only+)			
Qty	3	+	4
Qty	2	+	6
Qty	1	+	8
Qty	0	+	10+)
(Except Canada+)			
Qty	3	+	3
Qty	2	+	5
Qty	1	+	7
Qty	0	+	9+)

In the following table, attachment factors in the column labeled 'Base' are applicable to the base attachment factor calculation only. Attachment factors in the column labeled 'Base or Expanded' are applicable to either the base or expanded attachment factor calculation.

The 3600 controller loads support for devices/features into control storage in the sequence indicated by the following table. Those RPQs with an attachment factor are also loaded in a prescribed sequence, as indicated in the *IBM 3600 Finance Communication System Configurator* (GA27-2762). The controller will always attempt to load each device, feature or RPQ into base control storage. If a device, feature or RPQ is encountered that will not fit into base control storage and it is applicable to expanded control storage, the controller will attempt to load it into expanded control storage. The above algorithm must be used to determine control storage requirements.

Refer to the *3600 Finance Communication System Configurator* (GA27-2762) for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section: See "Attachment Factor Functions".

**Device Attachment Table**

Device Type/Feature/Function	Attachment Factor	
	Base	Base or Expanded
X.21 Adapter, Switched (#5656)	5.0	—
X.21 Adapter, Switched (#5656) extended diagnostic	6.0	—
SDLC (#4501 or #4502)	.7	—
Multiple Block I/O Diskette	3.0	—
3614 or 3624 [Note 1]	1.2	—
3616, 4710, 4720 [Note 5,6]	3.5	—
Optional Instruction Locator	.3	—
Instruction Enhancements	1.7	—
Address Sharing [Note 5,14,15]	—	.6
Secondary Logical Unit (LU) Assignment	—	.5
3606 [Note 14,15]	2.4	—
(Canada only+)		
Alternative Line Attachment Base [Note 8]	—	5.4
Dynamic Control [Note 9]	—	1.5
SDLC Link Diagnostics [Note 8]	—	0.8
SDLC/SNA Attachment Part 1 [Note 8]	—	8.0
SDLC/SNA Attachment Part 2 [Note 8]	—	5.8
Device Cluster Adapter [Notes 10,11]	—	5.0
3278 Mid 2 Attachment [Note 11]	—	4.5 +)
LSEKP [Note 2]	—	1.8
Translate Instruction (LRT) [Note 2]	—	1.2
3270/3600 Datastream Mapping	—	8.0
Extended 3270/3600 Keyboard Mapping [Note 7]	—	1.5

Data Decompress/Decompression [Note 2]	—	1.2
Data Compression/Compaction [Note 2]	—	1.6
SCRPAD Instruction [Note 2]	—	1.7
Extended LLOAD Instruction	—	.3
INTMR Instruction [Note 2]	—	1.0
Data Encryption Standard (DES) [Note 1]	—	1.5
Alternate Encryption Technique (AET) [Note 1]	—	1.0
Priority Dispatching (LCHAP) [Note 2]	—	.3
Data Sequencing	—	1.6
Extended Statistical Counter Recording [Note 2]	—	1.3
Disk File (5.2 or 9.3 meg)	—	10.0
(Canada only+)		
Extended Diskette Access Method (EDAM) Base	—	5.5
EDAM Allocate/Deallocate (LDKT Instruction) [Note 12]	—	1.7
EDAM Temporary File Support [Note 13]	—	1.5
3616, 4710, 4720 Part 2, 3262/3287 Part 1 [Note 5,6,10]	—	3.0
3262/3287 Part 2 [Note 10]	—	1.5 +)
3618	—	3.0
3615	—	3.2
3610, 3611 and/or 3612 [Note 3]	—	2.6
3608 Printer [Note 15]	—	2.8
Mag Stripe Encoder-Reader (#4905/#4906) [Note 4]	—	.7
Set Diskette	—	.9
3604 mdl 7	—	.5

**Notes:**

- Although both DES and AET may be included, a single 3614 may have either DES or AET but not both. A 3624 may have only DES.
- The optional instruction locator must be included if this function is used. If more than one function requiring the optional instruction locator is used, the attachment factor for the locator need be included only once.
- Any 3610, 3611 and 3612 combination constitutes one device type.
- The Magnetic Stripe Reader (#4901 or #4902) need not be considered in computing the attachment factor.
- Address Sharing must be included if a 3616, 4710, 4720 or 4704 mdl 1 is used. If more than one device/RPQ requiring address sharing is used, the attachment factor for address sharing need be included only once.
- Both 3616, 4710, 4720 Part 1 and 3616, 4710, 4720 Part 2 must be included when any of these devices is used. Any 3616, 4710, 4720 combination constitutes one device type. The Part 1 and Part 2 attachment factors need only be included once if more than one device or device type is used.
- 3270/3600 Datastream Mapping must be included if the extended 3270/3600 Keyboard Mapping is used.

**(Canada only+)**

- The Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1, and SDLC/SNA Attachment Part 2 together comprise the SNA Primary Interface support required in the controlling 3602 for controller to controller (3600 to 3602) communication via an SNA/SDLC interface. When used, these functions must all be loaded into the same controller storage (i.e., Base or Expanded). This SNA primary function is used in conjunction with the Fan-Out Communication Adapter (#1551) and the SDLC Communications Feature Without Business Machines Clocking (#4502) with specify #9551 for Controller Attachment.
- The Alternative Line Attachment Base must be included and loaded into the same controller storage (i.e., Base or Expanded) if Dynamic Control is used.
- The Device Cluster Adapter, 3262/3287 Part 1, and 3262/3287 Part 2 must be included if a 3262 and/or 3287 is used. The attachment factor for the Device Cluster Adapter need be included only once if any combination of the 3278 mdl 2, or 3262/3287 is used. The attachment factor for 3616, 4710, 4720 Part 2 and 3262/3287 Part 1 need be included only once if more than one of these device types is used.
- Both the Device Cluster Adapter and 3278 mdl 2 Attachment must be included if a 3278 mdl 2 is used. The attachment factor

**3602 Finance Communication Controller (cont'd)**

for the Device Cluster Adapter need be included only once if any combination of 3278 mdl 2, 3262 or 3287 is used.

- [12] The EDAM Base must be included if the Allocate/Deallocate function is used.
- [13] The EDAM Base must be included if EDAM Temporary File Support is used.+) )
- [14] Address sharing must be included if a 3606 is used.
- [15] Address sharing must be included if a 3608 is used. The 3606 must also be included to use the 3608 Keyboard/Display. Address sharing need be included only once to utilize both the 3608 Printer and Keyboard/Display.

**Add'l Disk Heads (#1010, #1011):** (#1010 for mdl 1A ... #1011 for mdl 1B.) Provides eight additional disk heads for the disk file as specified by mdl type selected. **Maximum:** One. **Field Installation:** Not recommended.

(Canada only+)

**Auxiliary Diskette Drive (#1015):** Provides approximately 560,000 bytes of additional diskette storage capacity via a second diskette drive. No area on the auxiliary (or secondary) drive will be reserved for the control program. **Maximum:** One. **Field Installation:** No **Note:** Support for feature #1015 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDET) instruction, and EDAM Temporary File Support. Refer to Device Attachment Table and Attachment Factor Functions section. The EDAM function is not required to use the Auxiliary Diskette Drive feature. The level of support provided without EDAM is limited to direct (absolute) addressing at the track and sector level.

**Fan-Out Communication Adapter (#1551):** Required to attach 3600 System Controllers (3601/3602) to a controlling 3602. Up to nine controllers may be attached per feature. (See M3601 pages for features required on the attaching 3601s.) **Limitations:** (1) Can only be installed on 3602s with B/M 4406687 installed. (2) Attached controllers must be within 30.4m (100 cable-feet) of the 3602. **Maximum:** Two. **Field Installation:** Yes. **Prerequisites:** Each Fan-Out Communications feature #1551 requires special feature SDLC Communications Without Business Machines Clocking (#4502) with specify #9551 for controller attachment. **Note:** Support for feature #1551 is provided by Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1 and SDLC/SNA Attachment Part 2. Refer to "Device Attachment Table", above.

**Device Cluster Adapter - DCA (#3101):** Provides for local attachment of a mix of up to eight 3262 or 3287 printers and 3278-2 display stations on a 3602. The number operable in a given application is dependent upon the user application program. When attaching the 3278 mdl 2 to the Device Cluster Adapter, no-charge RPO 8K0880 is required. **Limitations:** (1) Maximum distance from controller to terminal is 610 meters (2,000 feet) using shielded twisted pair-cable or 1,500 meters (4,920 feet) using coaxial cable. (2) When the Device Cluster Adapter is installed, loops number 4 and 8 are no longer available. **Maximum:** One. **Field Installation:** Yes.+)

**Add'l Loop (#4735):** Provides the ability to attach additional 3600 Finance Communication System terminals. **Limitations:** A maximum of two loops (including the provided local loop) operating at 4800 bps per 3602 are allowed when one of the SDLC communication features (#4501 or #4502) are specified (Canada only+ and Fan-Out Communications Adapter (#1551) is not specified +). Otherwise the maximum is one 4800 bps loop. **Maximum:** (Except Canada+ Seven. +) (Canada only+ Seven without #3101, five with #3101. +) **Field Installation:** Yes. **Prerequisites:** For each loop with any remotely attached terminals, #8001 or #8002 on a terminal, or a 3603 is required. **Note:** The sum of the speeds of all loops in bits per second (bps) plus the speed of the SDLC link (#6301 or #6302) in bps cannot exceed 12,000 bps (Canada only+ (each Fan-Out Communications Adapter (#1551) reduces the 12,000 bps limit by 1200 bps) +). When SDLC feature #4501 or #4502 (Canada only+ (without #9551) +) is installed, the sum of all loops cannot exceed 12,000 bps.

**Storage Expansion (#6501):** Provides capability of (1) expanding user-programmable storage (#1006 with #9592 or #1007 with #9602) beyond 56K bytes; and/or (2) adding additional increments of #1006 with #9591, beyond 16K bytes. **Limitations:** If IR 4 and Controller Data ECs 745122 and 745123 are utilized, the Controller will work properly with #6501 installed, but Control Storage Expansion cannot be utilized. If releases earlier than IR 4 and Controller Data ECs 745122 and 745123 are utilized, neither the Storage Expansion Feature (#6501) nor more than one Add'l Storage feature (#6501 with #9591) should be

installed. **Maximum:** One. **Field Installation:** Yes. **Note:** #6501 is required when more than 16K of additional control storage, Add'l Storage Feature (#1006 with #9591) or more than 32K of additional user-programmable storage, Add'l Storage Feature (#1006 with #9592) or Add'l Storage Feature (#1007 with #9602) are ordered.

**COMMUNICATIONS FEATURES**

Each 3602 must be equipped with one of the following SDLC features and either the EIA/CCITT Interface (#3701) or the 1200 bps Integrated Modem (#5500) or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656) for communication with the host processor.

**EIA/CCITT Interface (#3701):** Provides the appropriate cables and interface logic necessary to attach an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, IOS Standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages for communications to the host processor through the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or for communications to an 8100 Information System or for local attachment to the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor without requiring modems ... see M3704, 3705, 3725 or 4331 pages, feature #4716. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. **Limitations:** Cannot be installed with a 1200 bps Integrated Modem (#5500) or X.21 Adapter for Nonswitched Networks (#5655) or X.21 Adapter for Switched Networks (#5656). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501 ... #6302 or #4502.

**SDLC Communications With Business Machine Clocking (#4501):** Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any 1200 bps external modem which does not have internal clocking or for local attachment to a 3704, 3705, or 3725 at 1200 or 2400 bps (#4716). The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** Cannot be installed with #6301, #6302 or #4502 (unless #4502 has #9551 for controller attachment). +) **Maximum:** One. **Field Installation:** Yes.

**SDLC Communications Without Business Machine Clocking (#4502):** Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps or for local attachment to a 4331 Processor (#4801) at 1200, 2400, 4800 or 9600 bps. The SDLC link speed of this feature need not be included when calculating the sum of the loop speeds not to exceed the controller aggregate bps rate of 12,000 bps. **Limitations:** (Canada only+ For host connection without #9551. +) Cannot be installed with #6301, #6302 or #4501. **Maximum:** (Canada only+ One for host connection (without #9551) plus two with #9551 for controller attachment. +) (Except Canada+ One. **Field Installation:** Yes. **Prerequisites:** #3701, #5655 or #5656 (Canada only+ when ordered without #9551 and Fan-Out Communication Adapter #1551 when order with #9551. +) (Canada only+ Specify: When used in conjunction with #1551 for attachment of 3601s, specify #9551. +)

**1200 bps Integrated Modem (#5500):** An integrated modem for operation at 1200 bps over nonswitched half-duplex or duplex voice grade lines for communication to a host processor through the 3704, 3705, 3725 or the Communications Adapter (#1601) feature on the 4331 Processor or for communications to an 8100 Information System. This integrated modem must communicate with another IBM 1200 bps Integrated Modem. **Limitations:** Cannot be installed with EIA/CCITT Interface (#3701) or X.21 Adapter for Nonswitched Networks (#5655). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6301 or #4501. **Specify:** #9651 for 4-wire strapping, or #9652 for 2-wire strapping.

(Japan only+)

**X.21 Adapter For Nonswitched Networks (#5655):** This feature provides an interface and 6 meter cable for attachment to an X.21 native nonswitched network with no changes to existing SNA/SDLC procedures for controlling nonswitched lines. This feature will operate only with SNA/SDLC procedures. It enables the user to connect DCEs whose electrical characteristics match those described in CCITT Recommendation X.21 for nonswitched point-to-point and multipoint communication. The network establishes the data rate and supplies the clock. Speeds supported include 2400, 4800 and 9600 bps. **Limitations:** Cannot be installed with #5500, #3701, or #5656. Available only on controllers with serial number 9700019 or higher. **Prerequisites:** #6302 or #4502. +)

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**X.21 Adapter For Switched Networks (#5656):** An interface adapter and 6 meter cable for attachment to the X.21 switched network. SDLC communications at speeds of 2400, 4800 and 9600 bps are supported. **Limitations:** Cannot be installed with CCITT Interface (#3701), 1200 bps Integrated Modem (#5500) or X.21 Adapter for Nonswitched Networks (#5655). Available only on controllers with serial number 9700019 or higher. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4502.

**SDLC Communications With Business Machine Clocking (#6301):** Required for attachment to communication lines through the 1200 bps Integrated Modem (#5500) or any 1200 bps external modem which does not have internal clocking, or for local attachment to the 3704, 3705, or 3725 at 1200 or 2400 bps (#4716) or for communications to an 8100 Information System. **Limitations:** Cannot be installed with #6302, #4501 or #4502 (Canada only+ unless #4502 has #9551 for controller attachment). +) **Maximum:** One. **Field Installation:** Yes.

**SDLC Communications Without Business Machine Clocking (#6302):** Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 4800 bps or for local attachment to a 4331 a Processor (#4801) at 1200, 2400, 4800 or 9600 bps. **Limitations:** Cannot be installed with #6301, #4501 or #4502 (Canada only+ unless #4502 has #9551 for controller attachment). +) **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #3701 or #5655.

**1200 bps Loop Integrated Modem (#8001):** An integrated modem for transmission to remotely located 3600 Finance Communication System Terminals. Operates at 1200 bps over nonswitched normal quality voice-grade lines. **Note:** Several remote loop configuration variations can be realized; e.g., see the *IBM 3600 FCS Configurator*, GA19-0063. However, facilities are always point-to-point circuits, either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600 "remote loops". The customer should be referred to the configurator or information in the M2700 pages for definition of the tariffed elements of the remote loop. **Maximum:** One per Add'l Loop (#4735). **Field Installation:** Yes. **Prerequisites:** #4735. Each remote location must have either a 3604 Keyboard Display mdl 2, 3 or 4 equipped with a 1200 bps Loop Integrated Modem (#8001 or #8002), a 3614 or 3624 Consumer Transaction Facility with a 1200 bps Loop Integrated Modem (#8001) or a 3603 as the first attached remote unit in each physical (geographic) location.

**MODEL CONVERSIONS**

Model 1A can be changed to model 1B. This upgrade requires replacement of the disk storage (not diskette) device. Adequate provision must be made for retaining data contained on disk storage and elimination of user proprietary information. **Limitations:** If model 1A does not have Add'l Disk Heads (#1010) installed, field installation of the Add'l Disk Heads - for model 1B (#1011) concurrently with a model change from model 1A to model 1B requires the submission of an RPK.

**Attachment Factor Functions**

**Data Sequencing:** Allows user applications to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

**Set Diskette:** Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

**Instruction Enhancements:** Provides the user application with the following new instructions:

- Bit Manipulation - Test and Branch (LIFON, LIFOFF) - provide a test, set, and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.
- Logical Compare Data Immediate (CCDI) - compares immediate data to data in a specified field.
- Move Data Immediate (MVDI) - moves immediate data to a specified field.
- Load Data Immediate (LDDI) - loads immediate data into specified register.
- SCALE- formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In

the event that cents were not in the input data, zero padding is optionally provided. SCALE should significantly reduce the number of instructions required to process monetary input.

- Segment Indexing (SETX, TESTX, SETXREG) - provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instructions may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference (1) variable displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.
- Branch on Index (BRANX) - provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.
- Execute (LEXEC) - provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

**Priority Dispatching:** Provides the ability to specify the order in which 3601/2 workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP macro.

**Translate:** The LTRT instruction processes an input data stream against user specifiable translate tables(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

**Extended Statistical Counter Recording:** Provides the option to enhance statistical counter recording facilities to assist in fault isolation of degraded loop segments. This facility is particularly useful when a loop consist of multiple remote locations.

**Multiple Block I/O - Diskette:** Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than three blocks are read or four blocks are written.

**3602 Dynamic Sector Relocate:** This facility provides a means of recovery when a Write Sector CRC check occurs. This facility, in most cases, replaces the offline manual procedure which requires a special test diskette to reassign failing sectors.

**3270/3600 Datastream Mapping:** Provides, via four 3600 assembler language instructions, 3600 controller assistance in converting 3270 output display datastreams into an output datastream processable by 3600 attached devices, and 3604 input datastreams into 3270 input datastreams. Additionally, these instructions can aid in converting 3604 output display datastreams into 3270 output display datastreams.

**Extended 3270/3604 Keyboard Mapping:** Provides simulation of the 3270 Insert, Delete, Erase To End Of Field and Erase Input keyboard functions.

**LSEKIP Instruction:** Locates a table entry which is "equal to" "greater than or equal to" or "less than or equal to" a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program, thereby permitting the tables to reside in expanded user programmable storage.

**SCRPAD Instruction:** Provides access to optional global work areas distinct from segment storage which may reside in base or expanded user programmable storage.

**Data Compression/Compaction:** This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently occurring characters according to a user defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

**Data Decompression/Decompaction:** This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

**INTMR Instruction:** Permits the collection of elapsed time for events initiated and terminated by controller application program.

(Canada only+)

**Extended Diskette Access Method (EDAM) Base:** Provides the capability to open, access and close data sets on the primary or

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auxiliary diskette drive.

**EDAM Allocate/Deallocate (LDKT Instruction):** Provides, via the LDKT Instruction, capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

**EDAM Temporary File Support:** Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

**Dynamic Control:** Provides additional LCNTRL instruction functions to assist in controlling access to devices attached to the 3602 through the SNA Primary interface.  
+)

**Extended LLOAD Instruction:** Allows a controller application program to load data overlay into segments other than segment 14.

**Secondary Logical Unit (LU) Assignment:** Allows a controller application program to change the logical unit address associated with a given workstation.

**ACCESSORIES**

**Cables:** IBM shielded twisted-pair cable is required for attaching 3600 units. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories. For proper identification, installation and application of cable and associated accessories, refer to the *IBM Cabling System - Planning and Installation Guide*, GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation within your country.

Other applicable cable assemblies and associated accessories can be purchased from IBM. See *Physical Planning Manual*, GA27-2766 for cable and connector specifications. Specify bulk number, cable assembly number or part number as appropriate. Allow a lead time of 120 days.

Item No.	Description	Maximum Length
1563155	Loop Cable Assembly	609.6m (2,000')
4474809	Cable Assy (3609-2 to Modem)	2.08m (82 in)
1745372	Cable Assy (Loop Repeater to Loop Terminal Box)	7.62m (25 ft)
1745350	Cable Assy (3603 to Leased Lines)	7.62m (25 ft)
(Canada only+)		
1745349	Cable Assy (DDA to 3603)	7.62m (25 ft)
1741656	Cable Assy (joining 2 telephone lines)	N/A +)
(Canada only+)		
1745348	Cable Assy (3603 to Loop Terminal Box)	7.62m (25 ft) +)
4400029	Cable Assy (PTT leased line to 3603-3)	2.08m (82 in)
1142961	Bulk Cable (12 Conductor)	N/A
5252781	Bulk Cable (4 Conductor)	N/A
5252920	Bulk Cable (2 Conductor)	N/A
765294	Conn. Assy (EIA/CCITT)	N/A
5252769	Bulk Cable (2 Conductor)	N/A
5252913	Bulk Cable (4 Conductor)	N/A
1561344	Strain Relief	
1745363	Conductor Assembly (3603)	
5252763	Male Plug	
5252765	Female Plug	
5420242	Mini-Ty (used with 1745363)	

**(Canada and Japan only+)**

For attachment of a 3262 or 3287 to a 3694 or a 3602:

2577672	Cable Assy Indoor	1,500m(4,920ft)
or		
323921	Coax Wire	1,500m(4,920ft)
and		
1836418	Connector Kit	N/A +)

**Loop Repeater (P/N 4400002):** Plugs into the Loop cable and redrives all signals being transmitted in a 3600 Finance Communication System. Each Loop Repeater contains Loop redriving capabilities which allow for the extension of the Loop cable length by 2,000 feet. Loop Repeaters may be employed on a Loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. **Prerequisites:** An operating 3600 System Local Loop or Remote Subloop. **Publications:** GC22-0005.

**Customer Responsibilities:** The customer may be advised that: (1) The customer is responsible for making certain that the use of the equipment complies with all Country and Local Laws, Regulations, and Ordinances ... (2) The customer is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service ... (3) The customer is responsible for the set-up of the unit ... (4) The customer will determine the failing unit (see "Maintenance" below) ... (5) The customer is responsible for determining the required number of spares.

**Physical Planning and Setup:** Physical planning and setup is the responsibility of the customer. Attachment to the Loop cable is provided by ordering External Signal Cable Assembly (P/N 174372), or equivalent ... see *IBM 3600 Finance Communication System Installation Manual - Physical Planning*, GA27-2766.

**Spares:** The customer may wish to replace a failing unit with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, application requirements, physical locations and layouts. However, the minimum number of spare units recommended is shown in the following table:

# of Loop Repeaters Installed	Minimum # Spares Recommended
100	2
200	2
300	3
500	4
1000	6
1500	9
2000	10
2500	12
3000	14
3500	16
4000	18
4500	19
5000	21

**Warranty:** Service is available at the designated IBM Repair Center during the 90 day warranty period, which commences 30 days following date of shipment from the plant of manufacture (Raleigh). It shall be the customer's responsibility to set up the equipment. It shall be the customer's responsibility to determine the failing unit and remove it from the Loop, and if the unit is still under warranty, to pack it in the designated shipping container and ship it prepaid to the designated IBM Repair Center. IBM will return the serviced unit, shipping charges prepaid. There is no regularly scheduled preventive maintenance recommended by IBM on these units. Maintenance agreements are not available. CE on-site service will not be provided.

Ordering: Order P/N 4400002.

**Diskettes:** The following diskettes may be obtained by contacting IBM.

Diskette 1 (single-sided) 3601/3602	
256 byte format	P/N 2305845
128 byte format	P/N 2305830

Diskette 2 (double-sided) 3601-2B/3B, 3602-1A/2A	
256 byte format	P/N 2736700
128 byte format	P/N 1766870

**SUPPLIES (None)**

## 3603 TERMINAL ATTACHMENT UNIT

### PURPOSE

Attaches all 3600 System Controllers or 4700 Systems and terminals to the communication facilities. The 3603 enables remote subloop operation by connecting the controller loop feature to the communication facilities which connect to a remote 3603 with the subloop of terminals.

### MODELS

(Canada only) **Model 1 001:** Provides 1200 bps integrated circuitry for attachment to communication facilities and has switched network backup capability for use if the nonswitched communication line fails. <)

**Model 2 002:** Provides a CCITT interface for attachment of a 1200 or 2400 bps PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages. Other external modems may be attached subject to the Multiple Supplier Systems Bulletin.

(Except Canada) **Model 3 003:** Provides a 1200 bps integrated modem. <)

**Prerequisites:** A 3601 or 3602 with an Add'l Loop Feature (#4735) or a 4701 with or without Add'l Loop (#4745) is required for each remote loop that is attached with a 3603.

The 3603 mdl 2 with clocking (#6352) requires a synchronous modem that accepts Transmit Signal Element Timing from the 3600 system or 4700 system equipment. All new orders should include the clocking feature (#6352) for machines operating at 2400 bps. The 3603 mdl 2 without clocking requires an asynchronous modem. Before ordering the 3603 mdl 2, customer must check with modem manufacturer to determine their mode of operation. As an alternate to a 3603, a 1200 bps Loop Integrated Modem (#8001) in the 3601 or 3602 may be used.

**Note:** Several remote loop configuration variations can be realized; e.g., see the "IBM 3600 FCS Configurator", GA27-2762. However, regardless of the configuration, the interconnecting common carrier facilities are always point-to-point circuits; either 2-wire half-duplex or 4-wire duplex. The common carrier does not tariff 3600/4700 "remote loops". The customer should be referred to the configurator or information in the M2700 pages for definition of the tariffed elements of the remote loop.

### HIGHLIGHTS

- 50 Hz or 60 Hz power connection.
- Can be physically installed on a wall.
- Has self-test facilities to establish valid operation of the 3603 on a remote/local loop exclusive of the nonswitched network.

**Customer Responsibilities:** The customer must be advised that:

1. He is responsible to make certain that the use of the equipment complies with all national, regional, and local laws, regulations, and ordinances.
2. He is responsible for price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
3. He is responsible for the installation of the unit.
4. The customer will determine the failing unit (see "Central Facility Maintenance" below).

5. He is responsible for ascertaining the number of spares required.
6. The purchaser agrees that IBM is relieved of responsibility from all risks of loss of funds in transactions processed by the 3603.
7. (Except Canada) He is responsible for obtaining and installing the proper power plug on the power cable. <)

The customer is also responsible for the provision of a telephone channel and, with the 3603 mdl 2, an appropriate modem. A cable is available as an MES from IBM for a fee for attaching the 3603 mdl 2 to the modem. Connection of the modem to the communications line and the Controller is a customer responsibility.

The "IBM 3600 Finance Communication System Installation Manual - Physical Planning", GA27-2766, and the "IBM 3600 Finance Communication System Services Terminal - Terminal Installation Guide", GA27-2796, should be ordered for each customer installation.

**Publications:** GC20-0370

**Spares:** The customer may wish to replace a failing 3603 with a spare and must be advised to purchase sufficient spare units for such use. The number of spare units recommended is dependent upon the number of units the customer has installed, his application requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

No. of 3603s Installed	Minimum Number of Spares Recommended
---------------------------	-----------------------------------------

(Canada only)

	Mdl 1	Mdl 2
100	2	3
200	3	4
300	4	6
500	6	8
1000	10	14
1500	14	19
2000	17	24
2500	20	28
3000	23	33
3500	27	38
4000	30	42
4500	33	47
5000	36	51<)

(Except Canada)

	Mdl 2	Mdl 3
100	3	2
200	4	3
300	6	4
500	8	5
1000	14	8
1500	19	11
2000	24	14
2500	28	16
3000	33	19
3500	38	22
4000	42	24
4500	47	26
5000	51	29<)

**Central Facility Maintenance:** IBM will accept requests for special contracts for central facility maintenance. Under this offering, service will be performed at a repair facility located on customer

premises. The customer will continue to be required to determine the failing unit and to transport it to and from the facility. Contract requests should be directed to the Manager, Service Business and Contracts.

**Central Facility Maintenance - 1 (CFM-1):** CFM-1 service will be performed at a customer-owned facility. The customer is responsible for:

- Providing a maintenance facility which includes a 3600 System or 4700 System Controller and 3604 Keyboard Display or 4704 Display Terminal for exclusive customer engineering test use on prime shift at periodic intervals for repair of the 3603.
- Unpacking and installing the 3603 to operate with the 3600/4700 controller and common carrier at the CFM-1 site.
- Determining the failing unit.
- Contacting IBM Customer Engineering to repair the 3603 at the CFM-1 site when a designated number (minimum 2) of units are at the facility for repair. The customer will stock a number of spares equivalent to the sum of the number of designated units plus the appropriate spares recommended.
- Packing and delivering machines which have been serviced to the operational location.
- All shipping and handling charges.

#### SPECIFY

- Power (AC, 1-phase):

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811		
220V	#2813		
235V	#2814		

Field Installation: Not recommended.

- Machine Nomenclature:

Canadian French #2935	Italian #2932
English #2927	Japanese #2930
French #2928	Spanish #2931
German #2929	

Field Installation: Not recommended.

- Cables: Refer to M3601, 3602 or 4701 "Accessories". Refer also to the "3600 Installation Manual, Physical Planning", GA27-2766.

#### SPECIAL FEATURES

**Clocking (#6352):** (Mdl 2) Provides Transmit Signal Element Timing to synchronous modems (1200, 2400 bps). This feature is required for all synchronous modems (including Western 201C and equivalent modems). Field Installation: Not recommended.

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

Accessories for the 3603 may be purchased from IBM or a customer selected source. Allow a lead time of 120 days.

P/N	Description
78998	Fuse (0.3 Slow Blow - 220/230V 50 Hz)
78999	Fuse (0.5 Slow Blow - 100/110/123.5V)
1745353	Jumper Assembly (Signal Attenuation or Loop Speed)
5929886	Loop Plate (Loop Connector Assy)

#### SUPPLIES (NONE)

**3624 CONSUMER TRANSACTION FACILITY****PURPOSE**

An unattended self-service banking terminal that issues variable amounts of money, accepts deposits, and performs other financial transactions. Other documents, such as travelers checks, may be dispensed if they complete a document issue qualification test successfully. Attaches to a 3601 or 3602 or 4701 Finance Communication Controller or a 4702 Branch Automation Processor via loop or to a virtual storage S/370 or 4300 Processor via SDLC through a 3704, 3705 or 3725 Communications Controller. Communication is also possible via a Communications Adapter feature on a 4321 or 4331 Processor. A virtual storage S/370 attachment is also available via BSC through a 3704, 3705 or 3725.

**MODELS**

**Model 1 001:** Lobby - Single Document Feed Mechanism. For use inside a building in a secure attended location. The basic model includes a single cartridge feed station, card reader, user guidance keyboard and display unit and is suitable for counter-top or free-standing mounting. Also includes covers and front trim paneling. The covers contain locking handle, with a standard key, and provision for customer insertion of an additional keylock cylinder. A backlit logo panel, required for installation of lobby mdl, is available as a purchase accessory. A pedestal is available as a purchase accessory to mount the basic lobby model. A pedestal base is included as part of the depository special feature when the depository is added to the basic mdl.

**Model 2 002:** Through the Wall - Single Document Feed Mechanism. For outdoor, vestibule, drive-up, and otherwise less secure, unattended locations to provide availability on a 24-hour basis. The basic mdl includes a single cartridge feed station, card reader, user guidance keyboard, and display unit and has provision for mounting the currency dispensing and depository mechanisms inside a heavy-duty security enclosure. Covers are provided for the components not contained within the heavy-duty enclosure. A heavy-duty enclosure, pedestal base for mounting the enclosure, through-the-wall bezel, front trim paneling, and logo panel, for through-the-wall installation are available as purchase accessories.

**Model 11 011:** Same as model 1 but with dual document feed mechanism. Provides capability to issue the same or two different denominations in a single transaction; to load the same denomination in both dispensers, effectively doubling the bill capacity of a single denomination model 1 3624; or to issue currency and other documents as separate transactions (e.g., cash and travelers checks).

**Model 12 012:** Same as model 2 but with dual document feed mechanism. Provides capability to issue the same or two different denominations in a single transaction; to load the same denomination in both dispensers, effectively doubling the bill capacity of a single denomination model 2 3624; or to issue currency and other documents as separate transactions (e.g., cash and travelers checks).

**Prerequisites:** Each 3624 must be either loop-attached to a 3600/4700 or direct-attached to a S/370 or 4300 processor.

For Loop Attachment to a 3600/4700 -- there must be an available position on a local or remote loop of a Controller. The 3624 must have Terminal Loop Feature (#7820). See description of #7820.

For Direct Attachment to a S/370 or 4300 Processor -- S/370 or 4300 Processor requires a virtual storage processor and a 3704, 3705 or 3725 Communications Controller or the Communications Adapter feature on the 4331 that is equipped with appropriate features to communicate with a 3624 via SDLC. (See M3704, 3705, 3725 or 4331 pages.) The 3624 must have SDLC Communications feature (#6301 or #6302) for S/370 or 4300 Processor attachment or BSC Communications feature (#1421 or #1422) for S/370 attachment.

Encryption modules BQKDES is required with 3600 or 4700 Host Support Independent Release program. See your Area Program Release Support Center for the feature numbers used to order these modules on the 3600 or 4700 Host Support IR. Source listings are not orderable for, nor supplied with, these modules. Customers should be informed of this fact before the 3624 is ordered.

Depending on the configuration, Add'l Storage Feature (#1005, #1006 or #1007) may be required on the 3601; or Add'l Storage Feature (#1006 or #1007) may be required on the 3602 or Add'l Storage (#1008) may be required on the 4701. See M3601 or 4700 pages.

For 3624 mdls 2 and 12:

The following units are required for through-the-wall installation:

1. Heavy-Duty Enclosure, Single Function (#3901) or Dual Function (#3902).

**Note:** Single function enclosure cannot be field-modified to a dual function enclosure.

2. Bezel, Through-the-Wall, recessed or non-recessed. Recessed Bezel (#1490) is recommended for walk-up configuration. Non-recessed Bezel (#1491) is recommended for drive-up configuration.
3. Front Dress Panel (#3951). Front Trim Border, With Envelope Holder (#3961) or Without Envelope Holder (#3962).
4. Pedestal for single function heavy-duty enclosure (#4901) or dual function heavy-duty enclosure (#4902) is optional for mounting heavy-duty enclosure at appropriate height for walk-up or drive-up use. Storage Cabinet (#4903) is optional when mounting dual function heavy-duty enclosure without pedestal.

**Note:** Storage cabinet is included with Pedestals (#4901 and #4902). (See "Accessories" for descriptions and ordering information.) Purchase only.

Logo Panel -- Required on all 3624 mdls.

Currency Cartridge -- For 3624 mdls 1 and 2: One is required. For 3624 mdls 11 and 12: Two are required. Currency cartridges are not included with basic 3624 and must be ordered separately.

**HIGHLIGHTS**

Cartridge Loading -- currency cartridge provides for quick, easy loading and convenient, tamper-resistant transportation of the currency.

Issues Cash -- issues one (mdls 1 and 2) or two (mdls 11 and 12) denominations up to a maximum of 20 bills from a choice of accounts. Issues all bills at one time in a single stack; no pre-packaging or packets are used.

Individual Document-Feed Control -- allows each cartridge drive station on dual-feed mdls 11 and 12 to be associated with separate transactions (e.g., cash or travelers checks).

Accepts Deposits -- allows user to make a deposit to choice of accounts. Built-in depository envelope holder available as an accessory on mdls 2 and 12. Envelope holder included with depository on mdls 1 and 11.

Cash-Check -- a single transaction that allows cash to be issued to user, following deposit of a check.

Accepts Payments -- allows user to make various payments by depositing cash or check or by having funds deducted from user's account. Depository Cartridge Locking System -- depository cartridge and locking mechanism prevents removal of cartridge from machine unless cartridge is closed and locked; reduces need for dual-custody depository servicing.

**MACHINES**

**Depository Envelope Printer** -- prints unit and sequence number on envelope as it is deposited.

**Additional Transactions** -- provides account balance inquiry, funds transfer transaction, and special transactions.

**Keyboard/Guidance** -- comprehensive set of function keys and customized display messages step a user through a transaction. Keyboard and transaction functions can be modified through programming. Option for either numeric or alphanumeric keypad.

**Multiline Display** -- special feature provides 240-character, 6-line display. Includes additional display-related user response capability for expanded interaction between user and machine.

**Transaction Chaining** -- allows user to perform a series of transactions with a single insertion of a magnetic stripe card.

**Transaction Statements** -- can print and issue individual statements or messages to user.

**Journaling** -- can print and retain documents within the 3624.

**Backlighting Logo** -- backlighting logo panel that can be customized, extending across full width of the front panel.

**Host/Subhost Attachment** -- allows attachment to host CPU either directly via SDLC /BSC or through subhost 3600 or 4700 Controller via loop communications. Offhost operation at 3600 or 4700 is possible.

**Encrypt/Decrypt** -- encryption of sensitive data for communication line transmission. Uses the U.S. Federal Information Processing Data Encryption Standard (DES) algorithm.

**Multi-institution Usage** -- provision to accept magnetic stripe cards of many different card issuers. Base capacity of issuer identifier table within 3624 can be expanded by table overflow request message to host or with Add'l Storage special feature in 3624.

**Personal Identification** -- user account is identified through reading magnetic stripe card. To validate the identity of the person using the card, a personal identification number (PIN) is used. Validation of PIN (up to 16 digits) may be performed in the 3624 and/or host/subhost support system. Installation Configurations -- can be installed inside a building, for lobby use; or through-the-wall of a building, for walk-up or drive-up use.

**Multiple Languages** -- capability to display different languages based on identifier code recorded on magnetic stripe card.

**Third Track** -- special feature provides reading and writing third track data recorded on magnetic stripe card.

**Add'l Storage** -- special feature provides additional memory for expanding the number of custom messages and Financial Institution Table entries.

**Modular Packaging** -- for mdl 2 or 12 through-the-wall installation; currency dispenser and depository mechanisms are housed in a heavy-duty enclosure independent of other functional modules.

**Compatibility** -- 3614 family compatibility, designed to minimize transition requirements.

**Security** -- Mdl 2 and 12 installed with heavy-duty enclosure and through-the-wall installation accessories meet security requirements of UL291.

**Walk-up Configuration:** Recessed through-the-wall bezel, designed to provide a shelf surface for the user, is recommended for walk-up use.

**Drive-up Configuration:** Non-recessed through-the-wall bezel, designed to position the user area nearer the outer wall surface, is recommended for drive-up use.

**Customer Responsibilities, Installation Facilities** -- Because the 3624 mdl 2 or 12 attaches to customer premises, installation of cables, pedestal, heavy-duty enclosure, through-the-wall bezel, front dress panel, front trim border, and logo panel are customer responsibilities; the customer is also responsible for site preparation, such as cutting a hole in the wall. (APG only) For mdls 2 and 12,

with Specify Feature #0291 the customer is responsible for placement of the document feed and depository modules into the heavy-duty enclosure and attachment of the I/O module to the heavy-duty enclosure. Installation of cables and site preparation are customer responsibilities also, for 3624 lobby mdls 1 and 11.

**Keylocks** -- Covers included with lobby mdls 1 and 11 have a locking handle, with a standard key, and provide for customer insertion of an additional keylock cylinder. Covers included with through-the-wall mdls 2 and 12 have a keylock cylinder, with a standard key. Cabinet doors, included in all pedestals, have a keylock cylinder, with a standard key. The Dial Keylock available for the combination lock on the heavy-duty enclosure includes standard key. Currency cartridges provide for customer insertion of a keylock. Depository cartridge used with depository cartridge locking feature requires customer insertion of the depository keylock. Depository locking mechanism in 3624 requires customer installation of the depository cartridge locking key. If the customer desires to change the locks and/or keys included with these units or to install additional keylock cylinders where provided for, he is responsible for their procurement and installation.

**Machine Maintenance** -- IBM will not provide warranty or maintenance service on a 3624 containing money. The customer will be responsible for removing, controlling, and reloading all money in the 3624 so that IBM can fulfill its warranty and maintenance obligations.

**Accessories Maintenance** -- The customer is responsible for maintenance and parts procurement on all accessories.

If requested by the customer, CE will provide on-site service (on a per call billable basis) for the door mechanism (excluding lock) in the heavy-duty Enclosure. The CE can also perform (on a per call billable basis) the replacement of the following accessories: Front dress panel, bezel and trim border, logo lamps, logo lamp ballast assembly, currency area lockoff panel, currency area lockout panel lock assembly, storage cabinet, storage cabinet lock assembly, storage cabinet door hinges, logo panel, envelope holder lock and heavy-duty enclosure combination lock (lock replacement available only where licensing and bonding requirements permit). IBM services for repair or replacement of the above accessories will be on a per call billable basis. During the warranty period, parts for all accessories will be provided (when required), by IBM at no cost to the customer. For the post-warranty period, all accessory parts can be purchased by the customer through IBM. Currency and depository cartridge servicing can also be provided by CE on a per call billable basis.

**Notes**

1. Customer must arrange for DFM removal prior to CE replacement of DFM Slides.
2. Replacement of the heavy-duty enclosure door or door hinges remains a customer responsibility.

An optional maintenance service is available on IBM Currency Cartridges which are used on the 3624 Consumer Transaction Facility. This IBM service offering provides for CEs to deliver IBM On-Site Repair service for Currency Cartridges which are used in conjunction with a 3624 which is 1) under warranty, 2) under IBM Maintenance Agreement, or 3) under the Agreement for Lease or Rental of IBM Machines.

IBM provides this additional service for IBM Currency Cartridges under an amendment entitled Amendment to the IBM Maintenance Agreement for Currency Cartridges Used with a 3624. An incremental charge for each IBM Currency Cartridge covered under the Amendment will be invoiced to Customers who elect to have this service. This charge will be billed by applying a four digit code, similar to a feature code, to one or more of the installed 3624 machines and will be included on the customers monthly maintenance invoice. The code for Currency Cartridge Maintenance Service is #5550.

**Currency Cartridge** -- The 3624 Currency Cartridge is a purchase-only accessory and not included with the basic 3624. One cartridge for mdls 1 and 2 and two cartridges for mdls 11 and 12 are necessary for installation check-out and operation of 3624. Mdl 11 and 12 may also be operated with a single cartridge only. Car-

tridges are not maintained by IBM under the normal lease agreement or MMMC for purchased machine. The customer is responsible for determining if the cartridge is the failing unit; for providing cartridge for CE 3624 maintenance and testing, and for providing 3624 for testing of cartridges after cartridges have been repaired on-site at locations where on-site repair service is available (a minimum of one spare cartridge for mdls 1 and 2 and two spare cartridges for mdls 11 and 12 must be made available by customer to the CE for normal 3624 maintenance) and for setting the keying system on the cartridges and drive stations so that there is the desired match of currency denomination to drive station. See Customer Responsibilities in "Accessories" for installation and maintenance requirements.

**Currency Sorting** -- To achieve satisfactory operation, the customer must ensure that only new currency and good-quality used currency are used in the 3624. The general condition of used currency may vary. Used currency must be inspected to remove excessively worn, damaged, or torn bills. The "IBM 3624 Operator's Guide", GA66-0006, and "IBM 3624 Cartridge Owner's Manual", GA66-0005, contain procedures for preparation of new currency and inspection of used currency for operation in the 3624. For the 3624 mdls 11 and 12, the customer must ensure that each feed mechanism is loaded with the proper denomination currency. The cartridges contain a keying mechanism which can be set by the customer to ensure a match between specific cartridges and cartridge drive stations.

**Printer Ink Rolls** -- The customer is responsible for procurement and replacement of ink rolls in transaction statement and depository printers.

**Logo Lamp** -- The customer is responsible for procurement and replacement of the lamp in the logo panel light assembly.

**Damage** -- IBM is not responsible for misuse, vandalism, burglary, and damage to the 3624 and any 3624 accessories caused by firearms or explosives or other intentional damage. Repair of such damage is not covered under the IBM Lease/Rental Agreement, Maintenance Contract or Pilot Test Plan. Repair of such damage at cost of time and materials will be made to rental and pilot test machines and can be provided for purchase machines. For necessary contractual modifications, refer to ZM78-0016.

**System Integrity** -- Subhost operation, under control of the 3600 or 4700 Finance Communication Controller, requires customer systems design and support. Maintenance of system integrity in the subhost is a customer responsibility.

IBM is not responsible for any loss of money to the financial institution or its customers through the use of the 3624.

**Third Track System Security Statement** -- Customers ordering Third Track feature (#7950) must be advised that:

"IBM believes that the system security is optimized in an online environment, where PIN validation and transaction authorization can be performed in conjunction with positive-file data bases. The scope of security exposure expands with the degree of offline implementation, for which the Third Track might be used. The U.S. Federal Information Processing Data Encryption Standard (DES) algorithm is utilized to provide cryptographic security in the 3624 and may be used in conjunction with the third track application. IBM recommends that the customer consider using DES for this purpose. An optional security feature of the proposed ISO Third Track Data Content standard is a Crypto Check Digits (CCD) field in the card, which may be used to relate the data elements of track 3 to the magnetic stripe. This does not imply, however, that its use is not subject to fraud techniques. ISO has not prescribed using the optional CCD field or any specific CCD implementation technique. IBM recommends that the customer consider its value in his application, weighing possible enhancements in security with economic and

performance implications for his system. IBM will continue to pursue a course of action with customers and industry to maintain a high level of system security.

IBM reserves the right to modify the parameters of the Third Track functions if the parameters of the final ISO standard differ from those now in the process of standardization. However, this reservation of rights is not intended nor should it be construed as a commitment by IBM to support parameters different from those published by ISO/DIS 4909-June 1976."

**Publications:** GC20-0370

## SPECIFY

- (Canada only > Voltage (AC, 1-phase, 60 Hz): #9911 for 120V (usable on 115V). <)
- (Except Canada > Voltage (AC, 1-phase):
 

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
127V #2820	120V #9911
220V #2813	127V #2823
240V #2801	

**Note:** 120V AC is compatible with existing 115V systems. <)

- Cabling: Refer to "Installation Manual-Physical Planning", GA27-2766 and GA26-1658. Also see M3601 and 3602 pages.
- Machine Nomenclature: Specify one of the following:

Canadian English #2934	Japanese #2930
Canadian French #2935	Spanish #2931
English US #2924	

- Currency Denomination: Each currency denomination to be specified consists of a set of two codes: The first, to identify the country; and the second, to identify the denomination and issue series. Specify both of these codes for each denomination.

**Mdls 1 and 2:** Specify one Country-Denomination set only.

**Mdls 11 and 12:** Specify two different Country-Denomination sets or the same set twice.

**Note:** If 3624 mdl 11 or 12 is being used with the change-making capability, specify two different Country-Denomination sets; if 3624 mdl 11 or 12 is being used with single denomination, specify the same Country-Denomination set twice.

(Canada only > The 3624 is available in countries with currencies acceptable to the 3624. Orders will be accepted only for currencies which have successfully completed an issue test (see list of currencies). The currency issue tests may indicate that changes in the currency dispenser mechanism are required (because of size, opacity, and other unique characteristics of various currencies). An RPQ may have to be submitted and priced for these dispenser changes. To arrange for a currency test, submit an RPQ to SCD Special Engineering, Boeblingen, Germany. Specify currency denomination and issue to be tested. Specify both of the codes shown for each currency below, except U.S. (Specify #9091 only for U.S.): <)

*-----*			
Specify Both Numbers			
-----			
Country	Denom- ination	Currency	Series Issue
-----	-----	-----	-----

## MACHINES

#2778	#2702	Canada	10 dollar	Bank of Canada, 1971
#2778	#2703		20 dollar	Bank of Canada, 1969
#9091		USA	5,10,20 dollar	Federal Reserve Note
#2782	#2701	Venezuela	50 bolivare	Banco Central de Venezuela,
#2782	#2702		100 bolivare	Current Series

- **Keyboard Overlay Arrangement:** (For machines with US nomenclature (#2924) only) Specify #9301 for numeric-only overlay. Specify #9302 or #9303 for alphameric overlay. #9302 is the basic touch-pad telephone format with the Q and Z added over the numeric "0" and no alpha over the number "1". #9303 is the American Banking Association Standard for-

mat with the Q and Z over the numeric "1" and no alpha over the numeric "0". All are field installable.

Sample exhibit below illustrates #2924 with #9301. An RPQ should be submitted for a specialized keyboard overlay.

1		2		3		4		5		6		7		8	
Withdraw Cash	Deposit	From Checking	To Checking	1	2	3		Cancel							
Fixed Amount	Cash Check	From Savings	To Savings	4	5	6									
Account Balance	Payment	From Credit Card	To Credit Card	7	8	9		Change							
Transfer	Other Service	From Other Account	To Other Account	Corr- ection	0	Decimal Point		OK							

**Note:** Japan Triple Zero Key: When Japan Nomenclature is specified, the keyboard overlays will have a triple-zero (000) key in place of the comma (decimal position) key.

**Keyboard Mask:** Specify one of the following for standard keyboard mask arrangement; an RPQ should be submitted for

any keyboard mask not shown below. All are field installable. The Change key allows the user to request a change in the denomination mix to be issued on mdls 11 and 12. The change key is used also, on all mdls, to page displays with the Multi-line Display feature (#4750).

Specify Number		Transaction Type										From Acct to Acct			
Without Change Key (all mdls)	With Change Key (mdls 11/12) or All Mdls with #4750	W i t h d r a w a l (3)	S p e c i a l c e l l (3)	B a n c e r	T r a n s f e r	D e p o s i t d (2)	P a n c y l e n t	E p m t From Acct (2)	C a s h e c k (2)	C h e c k i n g	S a v i n g s	Credit Card	Other		
#9351	#9451	(1)								(1)					
#9352	#9452	(1)								0	0	0			
#9353	#9453	0		0						0	0	0			
#9354	#9454	0	0	0						0	0	0	0		
#9355	#9455	0	0	0						0	0	0	0		
#9356	#9456	0	0	0				0	0	0	0	0	0		
#9357	#9457	0	0	0	0	0	0	0	0	0	0	0	0		
#9358	#9458	0	0	0		0				0	0	0	0		
#9359	#9459	0	0	0	0					0	0	0	0		
#9360	#9460	0	0	0		0				(1)					
#9361	#9461	0	0	0						(1)					
#9362	#9462	0	0	0	0	0	0	0	0	0	0	0	0		
#9363	#9463	0	0	0		0			0	0	0	0	0		
#9364	#9464	0	0	0		0			0	(1)					

**Notes:**

1. Key position does not appear on the keyboard panel; single function is selected automatically.

2. Prerequisites: Depository #3233, #3234, #3243 or #3244.
  3. Prerequisites: Depository #3233, #3234, #3243 or #3244 if any Special transactions are customized to require a deposit step.
  4. Two different currency denominations should be specified if Change Key specified on mdl 11 or 12.
- Controller-Data Designation: 1st and 2nd position designation is required to control distribution and maintenance of controller-data media necessary for 3624 load images. Specify either #9491 or #9492 as follows:

1st Position Designator (#9491). Used to determine controller-data set to be distributed to host-system location. One 3624 attached to a host-system processor is specified #9491.

2nd Position Designator (#9492). Used to identify additional 3624s attached to host-system. Controller-data set media are not distributed to host-system location for any 2nd position designated 3624s.

When 1st position #9491 is specified, also specify one of the following:

If magnetic tape is used at the host system location:

#9412 9-track 800 bpi  
#9413 9-track 1600 bpi  
#9414 9-track 6250 bpi

If magnetic tape is not used at the host system location (DOS/VS users only):

#9431 80-column cards  
#9432 96-column cards

When 1st position #9491 is specified, additional information is required to determine the shipping address of the controller-data media. Supplemental Specifications are to be entered exactly as follows to indicate the shipping address of the host system location:

Line 1--IBM Programming Support Representative (PSR)  
Line 2--C/O (Name of Customer)  
Line 3--Street Address (or PO Box Number)  
Line 4 (etc.)--City, Country (Province), Postal Code

This is the address to which controller-data media will be automatically shipped after the first 3624 is ordered.

Changes to 1st Position Designators for On-order and Installed 3624s: If a 1st position #9491 3624 is deferred, cancelled, or discontinued and 2nd position #9492 3624s have been specified, then one 2nd position 3624 must be altered from 2nd to 1st position (from #9492 to #9491) to ensure continued distribution of controller-data media to host system location. When altering a 3624 to 1st position, include all items as required to be specified when #9491 is specified (items specified on previous 1st position 3624). If the host system location changes the input medium (e.g., from 1600 bpi to 6250 bpi tape), the media specify code must be changed on the 3624 with #9491 specified. In this case, the former media specify code must be deleted and the new one added by MES.

## SPECIAL FEATURES

**Add'l Storage (#1301):** Provides an additional 2,048 bytes of storage. The user can utilize this to increase the number of custom messages, entries in Financial Institution Table, and as might be necessary for RPQs. To determine the number of additional storage features required, see GC66-0009, "IBM 3624 Programmer's Reference Manual and Component Description". Maximum: Two if without Multiline Display (#4750). Five if with Multiline Display (#4750). Field Installation: Yes. Prerequisites: Storage Expansion Feature (#6501) is required for either: (1) First Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and SDLC Communications Feature (#6301 or #6302), (2) Or third Add'l Storage Feature (#1301) increment when ordered with Multiline Display

(#4750) and Terminal Loop Feature (#7820), (3) Or first Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and BSC Communications feature (#1421 or #1422).

**BSC Communications With Clocking (#1421):** Provides capability to attach to a host system (e.g., S/370) via BSC. Required for attachment to communications facilities through the IBM 1200 bps Integrated Modem (#5500), or through the EIA Interface (#3701) to any 1200 bps external modem which does not have internal clocking. Limitations: Cannot be installed with Terminal Loop (#7820), SDLC Communications feature (#6301 or #6302), BSC Communications Without Clocking (#1422), or 1200 bps Loop Integrated Modem (#8001). Maximum: One. Field Installation: Not recommended if Terminal Loop (#7820) or SDLC Communications feature (#6301 or #6302) is installed. Can be changed from BSC Communications Without Clocking (#1422) to BSC Communications With Clocking (#1421). Prerequisites: IBM 1200 bps Integrated Modem (#5500) if no external modem, or EIA Interface (#3701) if external modem. Transmission: This feature operates over common carrier communication facilities. For information concerning these facilities, see M2700 pages. External Modem: 3976-3 Modem operating at 1200 bps may be attached.

**BSC Communications Without Clocking (#1422):** Provides capability to attach to a host system (e.g., S/370) via BSC through 3704, 3705 or 3725. Required for attachment to communications facilities through the EIA Interface (#3701) to any external modem which provides internal clocking speeds up to 4800 bps. Limitations: Cannot be installed with Terminal Loop (#7820), SDLC Communications feature (#6301 or #6302), BSC Communications With Clocking (#1421), IBM 1200 bps Integrated Modem (#5500), or 1200 bps Loop Integrated Modem (#8001). Maximum: One. Field Installation: Not recommended if Terminal Loop (#7820) or SDLC Communications feature (#6301 or #6302) is installed. Can be changed from BSC Communications With Clocking (#1421) to BSC Communications Without Clocking (#1422). Prerequisites: #3701. Transmission: This feature operates over common carrier communication facilities. For information concerning these facilities, see M2700 pages. External Modems: IBM external modems that may be attached are:

3863 mdl 12 400/1200 bps nonswitched  
3868 mdl 12 400/1200 bps nonswitched  
3864 mdl 14 800/2400 bps nonswitched  
3868 mdl 24 800/2400 bps nonswitched  
3872 mdl 12 400/1200 bps nonswitched

**Depository Cartridge Locking (#3150):** (Mdl 2, 12) Provides locking mechanism in the depository that prevents removal of the depository cartridge unless it is closed and locked. Operates with Depository Cartridge (#3155). See "Accessories" for purchase of cartridges. Maximum: One. Field Installation: Yes. Prerequisites: #3243. Minimum of one #3155 is required for operation.

**Depository, Lobby (#3233):** (Mdl 1, 11) Provides envelope transport mechanism leading from a controlled access slot to deposit receptacle inside the 3624. The depository transport is designed to discourage tampering with previously inserted deposits. Includes a pedestal stand, with lockable rear access door and standard key, and a built-in depository envelope holder. Deposit envelopes may vary in size from 88.9mm x 152.4mm (3.5 x 6.0 in.) to 114.3mm x 247.7mm (4.5 x 9.75 in.) and shall be constructed of paper having basis weight of sub 20 through sub 28. Maximum thickness of a deposit envelope and its contents is 12.7mm (0.5 in.). Limitations: Cannot be installed in Pedestal, Lobby (#5510). Maximum: One. Field Installation: Yes.

**Depository, Through-The-Wall (#3243):** (Mdl 2, 12) Provides envelope transport mechanism leading from a controlled access slot in the security enclosure to deposit receptacle inside the 3624. In addition to the controlled access slot in the security enclosure, the depository transport is designed to discourage tampering with previously inserted deposits. Deposit envelopes may vary in size from 88.9mm x 152.4mm (3.5 x 6.0 in.) to 114.3mm x 247.7mm (4.5 x 9.75 in.) and shall be constructed of paper having basis weight of sub 20 through sub 28. Maximum thickness of a deposit envelope and its contents is 12.7mm (0.5 in.). Limitations: Cannot be installed with Heavy-Duty Enclosure, Single Function. Maximum: One. Field Installation: Yes. Note: Field installation requires Heavy-Duty En-

closure, Dual Function to have been initially ordered. Prerequisites: Heavy-Duty Enclosure, Dual Function (#3902).

**Depository Printer (#3245):** Prints sequence number on envelope as it passes through the depository throat. Six numeric digits are printed horizontally at repeated intervals along the envelope. Three digits are set by CE to identify unit, and three digits are automatically sequenced when envelope passes print station. The depository ink roll is P/N 457149. It is customer's responsibility to purchase and replace the ink roll when required. Maximum: One. Field Installation: Yes. Prerequisites: #3233 or #3243.

**EIA Interface (#3701):** (Canada only) Provides the appropriate internal cables and interface logic necessary to attach an external modem for communications attachment to the processor via BSC through the 3704, 3705 or 3725 SDLC through the 3704, 3705, 3725 or Communications Adapter on 4331 Processor. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. Note: Connecting cables must be ordered separately. Limitations: Cannot be installed with 1200 bps Integrated Modem (#5500) or Terminal Loop Feature (#7820). Maximum: One. Field Installation: Yes. Prerequisites: #6301 or #6302 or BSC Communications Feature (#1421 or #1422). Specify: If operation will be with an NTT modem in Japan, specify #2946.

**Multi-line Display (#4750):** Displays up to 240 characters (six lines of 40 characters each). Characters are presented in predefined 7x9 and 7x7 dot matrices for uppercase alphabetic, special characters, and language-unique characters, including the Hebrew alphabet. Additional interactive functions are provided for expanded communications between the user and the attached host. Maximum: One. Field Installation: Yes. Prerequisites: (1) The change key is required if display paging. See "Keyboard Specify". (2) Increased storage may be required to support larger size of display and additional interaction function. See Add'l Storage Feature (#1301) and Storage Expansion Feature (#6501).

**IBM 1200 bps Integrated Modem (#5500):** Provides an internal modem for communications attachment to the processor via SDLC /BSC at 1200 bps over nonswitched half-duplex or duplex voice-grade lines. Limitations: Cannot be installed with Interface (#3701), SDLC Communications Feature Without Clocking (#6302), BSC Communications Without Clock (#1422), Terminal Loop Feature (#7820), or 1200 bps Loop Integrated Modem (#8001). Maximum: One. Field Installation: Yes. Prerequisites: #6301, #1421. Specify: #9651 for 4-wire strapping or #9652 for 2-wire strapping. (Japan only) Specify #2943 for NTT D-1 Service Connection. <

**SDLC Communications With Clocking (#6301):** Provides capability to attach to a host system via SDLC, e.g., S/370 or 4300 processor through 3704, 3705, 3725 or Communications Adapter on 4331 Processor. Required for attachment to communications facilities through the IBM 1200 bps Integrated Modem (#5500), or through the Interface (#3701) to any 1200 bps external modem which does not have internal clocking. Limitations: Cannot be installed with Terminal Loop Feature (#7820), SDLC Communications Without Clocking (#6302) or 1200 bps Loop Integrated Modem (#8001) or BSC Communications Feature (#1421 or #1422). Maximum: One. Field Installation: Not recommended for field installation if Terminal Loop Feature (#7820) or BSC Communications Feature (#1421 or #1422) is installed. Can be changed from SDLC Communications without Clocking (#6302) to SDLC Communications With Clocking (#6301). Prerequisites: #5500 if no external modem, or #3701 if external modem. Transmission: This feature operates over (Canada only) common carrier < (Except Canada) PTT < communication facilities. For information concerning these facilities, see M2700 pages. External Modem: 3976 Modem mdl 3 operating at 1200 bps may be attached.

**SDLC Communications Without Clocking (#6302):** Provides capability to attach to a host system via SDLC, e.g., S/370 or 4300 Processor through 3704, 3705, 3725 or Communications Adapter on 4331 Processor. Required for attachment to communications facilities through the Interface (#3701) to any external modem which provides internal clocking speeds up to 4800 bps. Limitations: Cannot be installed with Terminal Loop Feature (#7820), SDLC Communications with Clocking (#6301), IBM 1200 bps Integrated Modem (#5500) or 1200 bps Loop Integrated Modem (#8001) or BSC

Communication Adapter (#1421 or #1422). Maximum: One. Field Installation: Not recommended if Terminal Loop Feature (#7820) or BSC Communications Feature (#1421 or #1422) is installed. Can be changed from SDLC Communications With Clocking (#6301) to SDLC Communications Without Clocking (#6302). Prerequisites: #3701. Transmission: This feature operates over (Canada only) common carrier < (Except Canada) PTT < communication facilities. For information concerning these facilities, see M2700 pages.

**External Modems:** IBM external modems that may be attached are:

Modems	Speed (bps)	Lines
3833-1	2400	Nonsw voice grade
3834-1	4800	Nonsw voice grade
3863-12	2400/1200	Nonsw or Sw voice grade
3864-1,2	4800/2400	Nonsw or Sw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3872-1	2400/1200	Nonsw or Sw voice grade
5811-10	2400/4800/ 9600	Limited distance modem
5811-18		Rack mount version of mdl 10
5811-20	2400/4800/ 7200/9600	Nonsw baseband
5811-28		Rack mount version of mdl 20

**Note:** 4-wire Switched Network Backup is available on 3863 and 3864. For communications capability, product utilization, and features, see M2700, 3863 and 3864 pages.

**Storage Expansion (#6501):** Provides capability to add increments of Add'l Storage Feature (#1301) if Multiline Display (#4750) is installed. Required for either: The first Add'l Storage Feature (#1301) increment when ordered with Multiline Display (#4750) and SDLC Communications Feature (#6301 or #6302), or Multiline Display (#4750) and BSC Communication Storage Feature (#1421 or #1422), or #1301 increment when ordered with Multiline Display (#4750) and Terminal Loop Feature (#7820). Maximum: One. Field Installation: Yes. Prerequisites: #4750.

**Terminal Loop (#7820):** Provides capability to attach to a 3600 or 4700 controller directly on a local or remote loop, or to a 3600 or 4700 controller indirectly through a 3603, 3604, 3614, or another 3624 on a remote sub-loop. Limitations: (1) Cannot be installed with SDLC Communications (#6301 or #6302) or BSC Communications Feature (#1421 or #1422) or Interface (#3701) or IBM 1200 bps Integrated Modem (#5500). See table below. Maximum: One. Field Installation: Not recommended if SDLC Communications (#6301 or #6302) or BSC Communications Feature (#1421 or #1422) is installed. Prerequisites: Available position on the loop. Also, see table below. Specify: See table below.

COMMUNICATE TO OR THROUGH	ATTACH- MENT	LOOP	NOTES
3601	Direct	Local Loop	1,2,3
3602	Direct	Local Loop	1,2,3
4701	Direct	Local Loop	1,2,3
4702	Direct	Local Loop	2,3
3601	Direct	Remote Loop	1,4,6
3602	Direct	Remote Loop	1,4,6
4701	Direct	Remote Loop	1,4,7
4702	Direct	Remote Loop	2,3,7
(Canada only)			
3603-1	Remote	Remote Subloop	1<
3603-2	Remote	Remote Subloop	1,2
(Except Canada)			

3603-3	Remote	Remote	Subloop	1<)
3604-2	Remote	Remote	Subloop	1,5,8
3604-3	Remote	Remote	Subloop	1,5,8
3604-4	Remote	Remote	Subloop	1,5,8
3614	Remote	Remote	Subloop	1,9
3624	Remote	Remote	Subloop	1,10

### Notes:

1. Specify #9062 for 1200 bps.
2. Specify #9063 for 2400 bps.
3. Specify #9064 for 4800 bps.
4. Requires #8001 (1200 bps Loop Integrated Modem).
5. Not recommended if 3624 is intended to operated while 3604 is not, e.g., evenings, weekends
6. Additional Storage (#1005, #1006, or #1007) may be required on 3600 Controller. See M3600 pages.
7. Additional Storage may be required on 4700 Controller. See M4700 pages.
8. Requires Line Feature Base (#4751 or #4752) and appropriate modem on 3604.
9. Requires Terminal Loop Feature (#7820) and 1200 bps Loop Integrated Modem (#8001) on 3614).
10. Requires Terminal Loop Feature (#7820) and 1200 bps Loop Integrated Modem (#8001) on 3624.

**Third Track (#7950):** Provides for reading data on track 2 and/or both reading and writing data on track 3 of magnetic stripe card. Presently conforms to ISO/3554/AD1 Third Track Standard, and proposed Data Content Standard ISC/DIS 4909. Can read tracks 2 and 3 independently or in conjunction with each other. Maximum: One. Field Installation: Not recommended.

**1200 bps Loop Integrated Modem (#8001):** Provides an internal modem for attachment to 3601/3602 remote loop. Operates at 1200 bps over nonswitched unconditioned voice-grade lines. Limitations: Not required if 3624 is attached to a 3600 or 4700 remote loop through a 3603, 3604 mdl 2, 3 or 4, 3614 or another 3624, or if attached to a 3600 or 4700 local loop. If there are both a 3604 and a 3624 located at the same remote loop location that does not have a 3603 or 3614, it is recommended that the loop modem (#8001) be located on the 3624 because the 3624 might often be operating while the 3604 is not, e.g., weekends. Maximum: One. Field Installation: Yes. Prerequisites: #7820. (Japan only) Specify: #2943 for NTT D-1 Service Connection. <)

**Transaction Statement Printer (#8201):** Prints document showing record of transaction and issues to user through the transaction statement slot; prints documents for audit use that can be retained in a journal stacker in the 3624. Print feed hopper has capacity of 2,000 documents. Journal stacker has capacity of 400 documents. Data is printed on 96-column card stock 66.7mm x 82.6mm (2-5/8 x 3-1/4 in.). Provides a 57-character set consisting of 56 printable graphics and space (blank). Four lines can be printed with up to 34 characters per line (maximum of 136 characters on each document). The data to be printed is determined by the host application program. Printing is overlapped with currency issue and user deposit cycles. Card Limitations: The 96-column card stock used in the statement printer must not have corner cuts. Detailed disclosure specifications describing 96-column card stock are available from IBM Corporation, Commercial Development Office, Armonk, N.Y. Maximum: One. Field Installation: Yes. Specify: Print Element Character Set Group:

Japan English #2955 US #2956  
Japan Katakana #2973  
Spanish Speaking #2969

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**Installation Accessories:** (Mdl 2, 12) (Purchase only) Provide heavy-duty steel enclosure. Through-the-wall bezel, front trim bor-

der, front dress panel, and pedestal base for installation of mdl 2 and 12 in configurations suitable for walk-up or drive-up use.

A heavy-duty enclosure is required. Two heavy-duty enclosures are available. A single function enclosure houses the currency dispensing mechanism on mdl 2 and 12 that do not have a depository. A dual function enclosure houses both the currency dispensing and the depository mechanisms on mdl 2 and 12 that have a depository. The dual function enclosure can also be used to house the currency dispensing mechanism only, on mdl 2 and 12 that do not have a depository. Both enclosures have a single rear access door that includes a combination lock and provides for a dial lock. The combination of the combination lock is set by the customer. The dial lock must be procured by the customer. A second combination lock is available as an optional feature. Both enclosures have a penetration-detection alarm grid across the inside of the front face. Construction of the heavy-duty enclosures meets requirements of UL291.

Pedestals are available in a number of sizes to mount the enclosure at a height most suitable for walk-up or drive-up use. The recommended nominal mounting heights are 1,308mm (51.5 in.) from keyboard centerline to walkway for walk-up use and 1,079mm (42.5 in.) from keyboard centerline to driveway for drive-up use. The difference in elevation between walkway or driveway and the mounting surface should be considered in selecting the pedestal height. Refer to "Installation Manual - Physical Planning", GA27-2766 and GA26-1658. A lockable storage cabinet with standard key is included with the pedestal when ordering a pedestal with the machine. A lockable storage cabinet only is also available that can be used with the dual function heavy-duty enclosure to mount the enclosure directly to a floor surface where a pedestal is not required.

A through-the-wall bezel, front trim border that fits around the bezel, and front dress panel that fits within the bezel are required. Two through-the-wall bezels are available: One with a recessed bezel providing a convenient shelf surface for user and recommended for a walk-up installation, and another with a non-recessed bezel positioning the user guidance area near the outside wall surface for more convenient use by a vehicle occupant and recommended for a drive-up installation. Two front trim borders are available: One with an envelope holder for depository transactions, and another without an envelope holder.

**Warranty:** These accessories are warranted free from defects in materials and workmanship for 90 days, commencing either on the date of installation or 30 days after shipment, whichever occurs first. IBM's obligation is limited to providing replacement parts on an exchange basis during the warranty period.

(APG only) Delivery Instructions: The "Heavy-Duty Enclosure" included in this group of accessories is a steel enclosure with dimensions of approximately 432 x 914 x 1575mm (17 x 36 x 62 in.) and weight approximately 950kg (2,100 lbs) for the dual function unit, and dimensions of approximately 432 x 914 x 991mm (17 x 36 x 39 in.) and weight approximately 680kg (1,500 lbs) for the single functions unit. The enclosure does not have casters and will be transported on a skid. <)

(AG only) Delivery Instructions: The 3624 mdl 2 and 12 will be shipped as three separate packages. The first package includes the heavy-duty enclosure, pedestal/storage cabinet and I/O module. This unit will be shipped on a pallet and will be 45"x 55"x 83" in total size. The total weight of the unit with pallet is approximately 3,500 lbs (3,100 lbs for 3624 without pallet).

The second package will contain the bezel and trim border. This is a palletized container weighing approximately 190 lbs and has dimensions of 59 x 45 x 24 in., including pallet.

The third package will contain miscellaneous ship items. This is a palletized container which may weigh as much as 250 lbs (depending on features and quantities ordered) and has dimensions of 50 x 42 x 40 in. including pallet. <)

The enclosure will be delivered under the normal delivery procedure but because of the dimensions and weight it is important that local provisions be made to have the enclosure delivered for physical installation at the selected site.

Close coordination should be maintained with the customer, the appropriate physical planning groups, and CE. Customer installation responsibilities should be noted as described in this section.

**Bezel, Through-The-Wall, Recessed (#1490), Non-Recessed (#1491):** (mdls 2, 12) (purchase only) Bezel for through-the-wall installation of 3624, #1490 is recessed, providing a shelf surface, and is recommended for walk-up installation. #1491 is non-recessed, placing the user guidance area nearer the outside wall surface for convenience of a vehicle occupant, and is recommended for drive-up installation. Prerequisites: #3901 or #3902, #3951, and #3961 or #3962. Field Installation: Yes. (AG only) Ordering: Order by feature number when ordering with a machine, otherwise order by P/N via MES. <)

**Depository Cartridge (#3155):** (mdls 2, 12) (purchase only) Portable container for receiving and transporting deposits. Required for operation with Depository Cartridge Locking Feature (#3150). Capacity of approximately 300 deposited envelopes (certain conditions could cause capacity to vary). Cartridge case is made of a high impact resistant, fire retardant material. Built-in carrying handle provides ease of loading transportation. Locking mechanism provides for customer insertion of keylock. The cartridge is loaded into the 3624 depository in the closed and locked condition. During loading, the locking mechanism in the depository unlocks and slides the cartridge door open without allowing access to the contents of the cartridge. During unloading, the locking mechanism slides the cartridge door closed and locks it before the cartridge may be removed from the 3624. Cartridges can be opened only by a companion key corresponding to the key in the 3624. There is also provision for affixing a seal to the locked cartridge. A mechanical counter, enclosed within the cartridge, is incremented each time the door is partially opened, providing an audit against unauthorized access.

**Customer Responsibilities:** The customer must be advised that:

1. The customer is responsible for procurement and installation of cartridge lock and for installation of the companion cartridge lock key in the 3624 depository locking mechanism.
2. The customer is responsible for determining required spare cartridges (see "Spares" below).
3. The customer is responsible for determining if the cartridge is the failing unit.
4. The customer is responsible for providing cartridge when required for CE 3624 depository maintenance and testing.
5. The Customer is responsible for replacement if required of the cartridge audit counter.
6. Purchaser agrees that IBM is relieved of responsibility for claims, including but not limited to, loss of currency or documents contained in or associated with the depository cartridge.
7. The Customer will be responsible for removing, controlling, and reloading all money and deposits in the 3624 when the unit has to be serviced by a CE.

**Maintenance:** Cartridges are not maintained by IBM under the normal lease agreement or MMMC for purchased machines. Replacement, if required, of the security lock and the internal audit counter in the cartridge is the responsibility of the customer. IBM Maintenance Agreements are not available. If requested by the customer, CE can provide on-site service of the cartridge on a per call billable basis. A CE can perform those maintenance operations (normally performed by the customer) that are described in the "3624 Cartridge Owners Manual" (GA66-0005). IBM Repair Center service is not available.

**Spares:** To maintain continual depository operations at the ATM, at least two cartridges are required. Additional spares may be required, depending upon deposit, volume between scheduled unloadings such as over weekends, physical lo-

cation of 3624s, where cartridge contents are removed, where temporarily stored, and the needs for problem determination in the event of depository malfunctioning. A recommended nominal quantity of cartridges per 3624, including spares is shown below. It assumes for every depository cartridge loaded in a machine, another cartridge has been unloaded, emptied and made available. In addition, approximately one spare is available for every five 3624s. This should provide sufficient quantities of spares for customer and CE 3624 testing and for replacement of inoperative cartridges. These quantities should be adjusted to the customer's particular system requirements.

	Recommended Quantity									
3624s	1	2	3	4	5	6	7	8	9	10
Cartridges	3	5	7	9	11	14	16	18	20	22
(incl. Spares)										

Cartridges required for more than ten 3624s can be extrapolated from the above table by taking a multiple of these numbers.

**Warranty:** The cartridge is warranted free from defects in workmanship and material for a period of 90 days, commencing either on the date of installation or 30 days after shipment, whichever occurs first. Defective cartridges will be replaced under the warranty provisions.

**Ordering:** (AG only) Order by feature number and specify quantity when ordering with a machine; otherwise order by P/N via MES. <)

**Dial Lock (#3310):** (mdls 2, 12) (optional) (purchase only) Provides keylock for the combination dial on a heavy-duty enclosure. Can be used where dual control and/or bank examiner type lock is desired. When locked, the combination dial cannot be turned. Specify: #9251 for key removable when locked or unlocked, dial must be locked by key or #9253 for key removable when locked only, dial must be locked by key. Limitations: Installed on only one combination dial when Dual Lock (#3375) is also ordered. Maximum: One. Field Installation: No.

**Currency Area Lockoff (#3312):** (mdls 2, 12) (purchase only) Provides a security panel to enclose the currency area. Enables the document feed mechanism to be locked in the machine. When used with the Depository Cartridge Locking Feature (#3150), it restricts access to the currency area during normal operational servicing of the depository and/or other areas of the 3624. Includes keylock and standard key. Note: This accessory does not change the customer's responsibility to remove any currency in the 3624 when the unit has to be serviced by a CE if customer desires to change lock and/or key provided, customer is responsible for their procurement and installation. Limitations: Cannot be installed with Heavy-Duty Enclosure, Single Function (#3901). Maximum: One. Field Installation: Yes. (AG only) Ordering: Order by feature number when ordering with a machine; otherwise order by P/N via MES. <)

**Dual Lock (#3375):** (mdls 2, 12) (optional) (purchase only) A second combination-lock for the rear access door of a Heavy-Duty Enclosure (#3901 or #3902). Field Installation: No.

**Heavy-Duty Enclosure, Single Function (#3901):** (mdls 2, 12) (purchase only) Used to enclose currency dispensing mechanism on 3624 mdls 2 or 12 that do not have a depository. Field Installation: No. Prerequisites: #1490 or #1491, #3951, and #3962.

**Note:** Pedestal (#4901), that includes a lockable storage cabinet, is available in several heights to mount the single function enclosure. Limitations: Cannot be installed with Depository, Through-The-Wall (#3243 or #3244), Pedestal for Dual Function Heavy-Duty Enclosure (#4902), Storage Cabinet for Dual-Function Heavy-Duty Enclosure (#4903), or Front Trim Border with Envelope Holder (#3961). Single Function Heavy-Duty Enclosure (#3901) cannot be field upgraded to a Dual Function Heavy-Duty Enclosure (#3902).

**Heavy-Duty Enclosure, Dual Function (#3902):** (mdls 2, 12) (purchase only) Used to enclose the currency dispensing and the de-

pository mechanisms on mdl 2 and 12 that have a depository. May also be used to enclose the currency dispensing mechanism only and provide spare lockable storage space on mdl 2 or 12 that do not have a depository. Note: Pedestal (#4902), that includes a lockable storage cabinet, is available in several heights to mount the dual function enclosure. A lockable storage cabinet only (#4903) is also available to mount dual function enclosure directly to a floor surface where a pedestal is required. Limitations: Cannot be installed with Pedestal for Single Function Heavy-Duty Enclosure (#4901), Heavy-Duty Enclosure (#3901). Prerequisites: #1490 or #1491, #3951, and #3961 or #3962. Field Installation: No.

**Front Dress Panel (#3951):** (mdls 2, 12) (purchase only) Provides panel to cover face of heavy-duty enclosure and I/O module. Prerequisites: #1490 or #1491, and #3901 or #3902. Field Installation: Yes. (AG only> Ordering: Order by feature number when ordering with a machine; otherwise order by P/N via MES.<)

**Front Trim Border, With Envelope Holder (#3961); w/o Holder (#3962):** (mdls 2, 12) (purchase only) Provides trim paneling around the bezel to seal through-the-wall installation. #3961 includes built-in depository envelope holder and is available only when the depository feature is installed. #3962 does not include a depository envelope holder. Prerequisites: (1) Bezel, Through-the-Wall, Recessed or Non-recessed (#1490 or #1491). (2) Front Trim Border, With Envelope Holder (#3961) requires Depositionary, Through-the-Wall (#3243 or #3244). Field Installation: Yes. (AG only> Ordering: Order by feature number when ordering with a machine; otherwise order by P/N via MES.<)

**Pedestal, for Heavy-Duty Enclosures (#4901 or #4902):** (mdls 2, 12) (purchase only) A mounting stand to locate the 3624 at a height most convenient for user operation. Includes a lockable storage cabinet. Available for single and dual function heavy-duty enclosures in heights appropriate for walk-up or drive-up use. Recommended nominal keyboard heights are 1,321mm (52.0 in.) for walk-up; 1,067mm (42.0 in.) for drive-up. #4901 is for 3624s that use the single function enclosure (#3901) and #4902 is for 3624s that use the dual function enclosure (#3902). Specify: For keyboard centerline height from mounting surface: #9701 for 1,079mm (42.5 in.), #9702 for 1,206mm (47.5 in.), or #9703 for 1,308mm (51.5 in.). Field Installation: Yes. (AG only> Ordering: Order by feature number when ordering with a machine; otherwise order by P/N via MES.<)

#### Notes:

1. If single function enclosure is installed without a pedestal, the keyboard centerline is 368mm (14.5 in.) from mounting surface.
2. See Storage Cabinet for Dual Function Heavy-Duty Enclosure (#4903) for installing with keyboard centerline height lower than 1,067mm (42.0 in.) from mounting surface.

**Storage Cabinet for Dual Function Heavy-Duty Enclosure (#4903):** (mdls 2, 12) (optional) (purchase only) Lockable storage cabinet only, for mdl 2 or 12 dual function enclosure mounted directly to floor surface without pedestal. The keyboard centerline height is 965mm (38 in.) from mounting surface. A standard key is provided. Limitations: Cannot be installed with Heavy-Duty Enclosure, Single Function (#3901). Prerequisites: Heavy-Duty Enclosure, Dual Function (#3902). Field Installation: Yes. (AG only> Ordering: Order by feature number when ordering with a machine; otherwise order by P/N via MES.<) Note: Storage cabinet is included with the Pedestal for dual Function Heavy-Duty Enclosure (#4902).

**Pedestal, Lobby (#5510):** (mdls 1, 11) (purchase only) A mounting stand for free-standing configuration of lobby mdl without the depository feature. Note: #5510 is not required if customer intends to install a mdl 1 or 11 without the depository feature on an alternative mounting surface or stand. #5510 is not required if a mdl 1 or 11 is installed with a depository feature (#3233), since a pedestal base is included in #3233. Field Installation: Yes. (AG only> Ordering: Order by feature number when ordering with a machine; otherwise order by P/N via MES.<)

**Currency Cartridge (#9110 - P/N 945369):** (purchase only) Portable currency container, interchangeable between 3624s. Cartridge case is made of a high-impact resistant, fire retardant material. Removable access cover and built-in carrying handle, for ease of

loading and transportation. Locking mechanism provides for customer installation of keylock and affixing security seals to transport of the cartridge. The cartridge is connected to a cartridge drive station in the 3624 for power and communication of cash-low and cash-out currency levels. A keying system is provided so that a match between the cartridge and the cartridge drive station must be satisfied before the cartridge can be properly loaded in the drive station. The maximum new bill capacity is 2,300 bills. The used bill capacity is approximately 2,000.

**Customer Responsibilities:** The customer must be advised that:

1. The customer is responsible for determining if the cartridge is the failing unit.
2. The customer should schedule the frequency of cleaning and belt replacement procedures for optimum cartridge performance according to the usage, to maintain maximum machine availability.
3. The customer may repair the cartridge, have repair work by the CE on-site where the on-site repair service is available, or he may send it back to the Repair Center (see "Maintenance" below).
4. The customer is responsible for determining required spares (see "Spares" below).
5. The customer is responsible for providing cartridges for CE 3624 maintenance and testing; a minimum of one spare cartridge for mdl 1 and two spare cartridges for mdls 11 and 12 must be made available by the customer to the CE for normal 3624 maintenance.
6. The customer is responsible for setting the keying system on the cartridges and drive stations so that there is the desired match of currency denomination to drive station.
7. Purchaser agrees that IBM is relieved of responsibility for all claims, including, but not limited to, loss of currency or documents contained in, dispensed by, or associated with the cartridge.

**Spares:** The customer may wish to replace (1) an empty or partially loaded cartridge with a fully loaded cartridge, (2) a failing cartridge with a spare for problem determination or while malfunctioning cartridge is being repaired, (3) A cartridge to enable the IBM CE to perform 3624 maintenance and testing. The customer should be advised to purchase sufficient cartridges to cover the above uses. The number of cartridges recommended is dependent upon the total number of cartridge drive stations the customer has installed, application requirements, physical location of 3624s, and location where cartridges are temporarily stored and loaded. The customer must be advised that it is recommended that spare cartridges should remain in use and not be stored for extended periods. A recommended quantity of spare cartridges and spare replacement belts per cartridge drive station is shown below. It assumes for every loaded cartridge installed in a cartridge drive station, another cartridge for the same currency denomination is available for currency replenishment. In addition, approximately one spare is available for every three cartridge drive stations of the same currency denomination. This should provide sufficient quantity of spares for customer and CE 3624 testing and for temporary replacement of cartridges in repair. These quantities should be adjusted to the customer's particular application requirements once he understands how his physical environment and usage affect cartridge and belt wear. The customer can replace separator and restraint belts in conjunction with performing the recommended operator cleaning and belt replacement procedure. Additional belts can be ordered from the Sale of IBM parts or MES/Part I.

#### RECOMMENDED MINIMUM QUANTITY OF SPARES AND REPLACEMENTS

Cartridge Drive Stations*	Recommended Quantity of Currency Cartridges	Separator Belt P/N	Restraint Belt P/N
		945307	945242

1	3	1	1
2	5	1	1
3	7	1	1
4	10	2	2
5	12	2	2
6	14	2	2
7	17	3	3
8	19	3	3
9	21	3	3
10	23	3	3

\* 3624 Mdl's 1 and 2 have one cartridge drive station and mdl's 11 and 12 have two cartridge drive stations.

Cartridges and belts required for more than ten drive stations can be extrapolated from the above table by taking a multiple of these numbers. Additional quantities over the recommended minimum quantity of spare replacement belts should be ordered as required as part of the customer's periodic belt inspection and replacement schedule for cartridges (in conjunction with IBM's general recommendation).

**Maintenance:** Cartridges are not maintained by IBM under the normal lease agreement or MMMC for purchased machine. A recommended operator cleaning and belt replacement procedure is provided in the "IBM 3624 Cartridge Owner's Manual", GA66-0005. Under adverse operating conditions, it is the customer's responsibility to modify the procedure to meet his own particular requirements. The customer can replace separator and restraint belts in conjunction with performing the recommended procedure. If the cartridge is in need of repair, the cartridge can be sent to the Country Receiving Center for Canada or the designated Repair Center for Japan; for all other countries, the repair will be done by the CE on-site on a time-and-material basis. In Canada and Japan, it is the customer's responsibility to package the unit in the designated shipping container and ship it prepaid to the service location.

An optional maintenance service is available on IBM Currency Cartridges which are used on the 3624 Consumer Transaction Facility. This IBM service offering provides for CEs to deliver IBM On-Site Repair service for Currency Cartridges which are used in conjunction with a 3624 which is 1) under warranty, 2) under IBM Maintenance Agreement, or 3) under the Agreement for Lease or Rental of IBM Machines.

IBM provides this additional service for IBM Currency Cartridges under an amendment entitled Amendment to the IBM Maintenance Agreement for Currency Cartridges Used with a 3624. An incremental charge for each IBM Currency Cartridge covered under the Amendment will be invoiced to Customers who elect to have this service. This charge will be billed by applying a four digit code, similar to a feature code, to one or more of the installed 3624 machines and will be included on the customers monthly maintenance invoice. The code for Currency Cartridge Maintenance Service is #5550.

If requested by the customer, CE can provide on-site service of the cartridge on a per call billable basis. CE can perform those maintenance operations (normally performed by the customer) that are described in the "3624 Cartridge Owners Manual" (GA66-0005). CE can also provide maintenance services that are provided by the Repair Center. For the CE to provide this service the customer must provide the CE contents of B/M 4801538 which includes the MIMS package, throat adjusting tool and cassette diagnostic tape. For IBM to provide cartridge servicing, the customer must provide a 3624 for testing of the repaired cartridge. It is recommended that the customer provide IBM with repair service facilities at a central site (rather than at a branch location). Note: Currency cartridge warranty service must be performed at the IBM Repair Center only.

**IBM Repair Center Service:** For cartridge repair, the customer will fill out an IBM Repair Authorization Form, GX27-2981, pack it and the defective cartridge in the designated shipping container, and ship it to the designated IBM Repair Center, where repair will be made if the cartridge is repairable. The charge for the repair of the cartridge at IBM repair Center will cover handling, inspection, cleaning, repair, adjustment, testing, and return shipping. Billing will be at IBM's applicable hourly rates. In addition, all parts needed will

be billed at IBM's prevailing parts prices. Alternately upon request, the IBM Repair Center will provide, for a minimum charge, an estimate of repair charges.

If, on the basis of an inspection, the repair center concludes that a cartridge is not repairable, no further work will be performed and the cartridge will be returned to the customer with a minimum charge to cover handling, inspection, testing, and return shipping charges.

**Warranty:** The cartridge is warranted to be free from defects in workmanship and material for a period of 90 days commencing either on the date of installation or 30 days after shipment, whichever occurs first. Warranty service for the cartridge will be performed at the IBM Repair Center for Canada and Japan, or on-site by the CE for all other countries. If warranty service is performed at an IBM Repair Center, the customer will fill out an IBM Repair Authorization Form, GX27-2981, pack it and the defective cartridge in the designated shipping container, and ship it prepaid to the designated IBM Repair Center. Ordering: Order by feature number below and specify quantity (AG only) when ordering with a machine; otherwise order by P/N via MES (<).

### CURRENCY CARTRIDGE SUMMARY FEATURE

Canada	10,20 dollar	#2721
Venezuela	50,100 bolivares	#2721

**Note:** For cartridge parts, refer to the "IBM 3624 Cartridge Owners Manual", GA66-0005.

**Logo Panel (#9401 or #9403):** (purchase only) Backlighting Logo Panel, suitable for customization by silkscreening or other acceptable process.

If #9401 is ordered, logo panel(s) will be shipped with the 3624. Note: More than one panel may be ordered when #9401 is specified (e.g., customer may desire to order spares or to arrange to have several panels delivered with the first of several 3624s for customization at one time). When more than one panel is ordered using #9401, then #9403 should be specified on the other 3624s to avoid duplicating orders for logo panels.

If #9403 is ordered, the logo panel will not be shipped with the 3624 and must have been ordered separately by P/N, or as #9401 on another 3624.

**Note:** Additional Logo Panels can be ordered by P/N via IBM.

### (AG only) Accessory Spares and Replacements

When ordering the following accessories as spares or replacements, order by part number via MES.

- P/N 0945618: Logo Panel for Mdl's 1,11
- P/N 0945617: Logo Panel for Mdl's 2,12
- P/N 4948345: Recessed Through-the-Wall Bezel and Front Trim Border With Envelope Holder
- P/N 4948347: Recessed Through-the-Wall Bezel and Front Trim Border Without Envelope Holder
- P/N 4948346: Non-Recessed Through-the-Wall Bezel and Front Trim Border With Envelope Holder
- P/N 4948348: Non-Recessed Through-the-Wall Bezel and Front Trim Border Without Envelope Holder
- P/N 0945454: Pedestal with cabinet for mdl's 2, 12 Dual Function 42 inch height for 1/2 inch safe
- P/N 0945455: Pedestal with cabinet for mdl's 2, 12 Dual Function 47 inch height for 1/2 inch safe
- P/N 0945456: Pedestal with cabinet for mdl's 2, 12 Dual Function 52 inch height for 1/2 inch safe
- P/N 0945458: Pedestal with cabinet for mdl's 2, 12 Single Function 42 inch height for 1/2 inch safe
- P/N 0945459: Pedestal with cabinet for mdl's 2, 12 Single Function 47 inch height for 1/2 inch safe
- P/N 0945460: Pedestal with cabinet for mdl's 2, 12 Single Function 52 inch height for 1/2 inch safe
- P/N 0945463: Pedestal for Mdl's 1, 11
- P/N 4757358: Storage Cabinet for Dual Function 1/2 inch Heavy Duty Enclosure

P/N 0945492: Storage Cabinet for Dual Function 1 inch Heavy  
Duty Enclosure  
P/N 4948356: Front Dress Panel for Heavy Duty Enclosure  
Single Function  
P/N 4948355: Front Dress Panel for Heavy Duty Enclosure  
Dual Function  
P/N 4795770: Depository Cartridge  
P/N 0945626: Currency Area Lockoff  
P/N 0945369: Currency Cartridge, US <  
(Canada only > P/N 0945357: Currency Cartridge, Canada <)

**Accessory Repair Parts**

Repair parts are referenced in:

- IBM 3624 Consumer Transaction Facility Cartridge Owner's Manual, GA66-0005.
- IBM 3624 Consumer Transaction Facility Accessories Owner's Manual, GA66-0012.

IBM will not order customer requested parts, if these parts are not available at IBM.

**SUPPLIES (NONE)**



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MACHINES

M 3641.1

Sep 84

Major Revision

## 3641 REPORTING TERMINAL

### PURPOSE

The 3641 Reporting Terminal is an interactive workstation with a wide range of options to meet individual customer requirements for data entry and response.

### MODELS

**Model 1 001** Has a 22-character alphanumeric display. Either a 35-key numeric keyboard or 70-key alphanumeric keyboard feature must be specified. Optional features include a Magnetic Reader Attachment and a Digital Input/Digital Output with 32 input and 8 output points.

#### Prerequisites:

1. Either the 35-key numeric keyboard (#4652) or the 70-key alphanumeric keyboard (#4653) must be specified on the 3641.
2. A Loop Station Connector on a 3631/3632 or 3842/3843 loop, 4331 Loop Adapter or 8100 system loop.
3. Magnetic Reader Attachment (#4910) must be specified if either the Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader is ordered.

**Note:** When ordering this machine for attachment to an 8100 system, "Terminal Requirements" under the appropriate M8130, 8140 or 8101 pages should be reviewed. When ordering this machine for attachment to a 4331 system, the appropriate M4331 pages should be reviewed.

**Customer Setup (CSU):** Machine only.

### HIGHLIGHTS

The 3641 is an interactive workstation terminal that is designed to be used on a table, counter, work bench or mounted via an accessory bracket on a wall or column. Its capability includes:

- An easy-to-read display for input verification of keyed data and alphanumeric operator messages of up to 22 characters.
- Display of alphanumeric and special characters. The display character set includes graphics for many languages. The symbols displayed are governed by a translation table in the system controller -- see the 3641 description in the *3630 Plant Communication System Description* or *4331 Loop Adapter Description*.
- Function keys for user-defined transactions.
- Special features for fixed data input include a magnetic reader adapter.
- A Digital Input/Digital Output feature for the exchange of data between the 3641 and customer devices.
- A removable keyboard overlay and function key mask which can be customized by the customer.

**Customer Setup:** The 3641 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3641 at time of delivery or when relocating the 3641.
- Removing and packing of the 3641 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3641 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network.

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** Maintenance of the 3641 terminals will normally be performed at the installed location.

There is no regularly scheduled IBM preventive maintenance. If purchased, the terminals are eligible for maintenance coverage

immediately following expiration of the warranty period at a monthly charge.

**Physical Environments:** The 3641 and accessories may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning*, GA24-3675.

#### Publications:

*IBM 3630 Plant Communication System, System Description*, GA24-3652,  
*Introduction to the IBM 8100 Information System*, GA27-2875  
*Guide to the IBM 4331 Processor*, GC20-1878  
*IBM 4331/3640 Information Handbook*  
*IBM 3641 Reporting Terminal Operating Guide*, GA24-3679

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

#### (Canada only+)

- Voltage (120V AC, 1-phase, 60 Hz): #9890 for locking plug, or #9891 for non-locking plug.

**Note:** 120V AC is compatible with existing 115V AC systems. +)

#### (Except Canada+)

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
220V #2813	120V #2802
240V #2801	

**Note 1:** 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

**Note 2:** A power cord and plug will be shipped from the plant of manufacture. The 3-digit country code in the DP Machine Order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the *IBM 3630 Plant Communication System, Installation Manual- Physical Planning*, GA24-3675.

- Power Plug: If #2802, #2804, or #2730 voltage is specified, then #2714 (non-locking plug) or #2715 (locking plug) must be specified. +)
- Power Cable:
  - 1.8m (6 ft) cable - #9986
  - 4.3m (14 ft) cable - #9987
- Communication Cable: A communication cable (Loop Station Connector, LSC, cable) is provided for attachment to a direct-attached or data link-attached loop. Specify #9976 for a 1.8m (6 ft) cable or #9977 for a 4.3m (14 ft) cable.
- Color: Specify #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.
- Machine Nomenclature: Character set specification is not required.

Canadian French #2935	Portuguese (Brazil) #2933
English US #2750	Spanish Speaking #2931
Japanese #2930	

**Note:** When #2930, Japanese nomenclature, is specified, the display character set and keyboards include Katakana graphics.

### MODEL CONVERSIONS (None)

## 3641 Reporting Terminal (cont'd)

### SPECIAL FEATURES

**Digital Input/Digital Output (#3251):** Provides 32 bits of TTL-compatible digital input and 8 bits of TTL-compatible digital output on the 3641. **Maximum:** One. **Field Installation:** Yes.

**35-Key Numeric Keyboard (#4652):** Provides 15 customer-defined function keys, 5 control keys, 10 numeric keys and 5 special character keys. **Limitations:** Cannot be installed with #4653. **Maximum:** One. **Field Installation:** No.

**70-Key Alphameric Keyboard (#4653):** Provides 20 customer-defined function keys, 5 control keys, 10 numeric keys, A-Z, and 9 special character keys. **Limitations:** Cannot be installed with #4652. **Maximum:** One. **Field Installation:** No.

**Magnetic Reader Attachment (#4910):** Used to attach a Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader on the 3641. The two magnetic readers are plug compatible. **Maximum:** One. **Field Installation:** Yes.

### ACCESSORIES

#### MAGNETIC HAND SCANNER

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

**Ordering Instructions:** See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be preformed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form* (#2110), pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a time-and-materials basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time-and-materials basis at the Repair Center. Authorization Form #2110 applies.

**Magnetic Hand Scanner: P/N 4123495.**

#### MAGNETIC SLOT READER MAGNETIC SLOT READER, DUAL ENTRY

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

**Ordering Instructions:** See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be preformed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form* #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. Authorization Form #2110 applies.

A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

**Magnetic Slot Reader: P/N 4123500** or feature code #9441.

**Dual Entry Magnetic Slot Reader: P/N 4123520** or feature code #9442.

#### MAGNETIC READER/SCANNER EXTENSION CABLES

These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. **Limitations:** Extension cables cannot be plugged into other extension cables. @SS@

**Cable 6.0m (19.7 ft): P/N 4832986.**

**Cable 12.0m (39.4 ft): P/N 4832987.**

**3641 Reporting Terminal (cont'd)**
**MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES**

Description	P/N
MHS Sensor Head Assembly	4832721
MHS Handle and Feedback Assembly	4832701
MHS Amplifier Card and Cable Assembly	4832727
DEMSR/MSR Arm and Sensor Head Assembly	4832963
DEMSR/MSR Base and Feedback Assembly	4832973
DEMSR/MSR Amplifier Card and Cable Assembly	4832962
MSR Cover	4832964
DEMSR Cover	4123486

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

**Magnetic Hand Scanner**

Number of MHSs	Sensor Head Assemblies	Handle and Feedback Assembly	Amplifier Card and Cord Assembly
# 4123495	# 4832721	# 4832701	# 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

**Magnetic Slot Reader**

Number of MSRs	Arm and Sensor Head Assembly	Base and Feedback Assembly	Amplifier Card and Cord Assem	Cover
# 4123500	# 4832963	# 4832973	# 4832962	# 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Dual Entry Magnetic Slot Reader**

Number of DEMSRs	Arm and Sensor Head Assembly	Base and Feedback Assembly	Amplifier Card and Cord Assem	Cover
# 4123520	# 4832963	# 4832973	# 4832962	# 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Ordering Instructions:** See IBM.

**Warranty:** Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**WALL MOUNTING BRACKETS**

A 2-piece mounting bracket is available to mount the 3641 Reporting Terminal to a wall, column, or other vertical surface.

One piece mounts on the 3641 and the other mounts on the vertical surface. There are four bracket holes on the back of the 3641 and four mounting screws supplied with the brackets. The customer is responsible for supplying the fasteners for the wall bracket.

**Ordering Instructions:** See IBM.

**Warranty:** Wall mounting brackets are warranted free from defects of workmanship and materials for 90 days.

**Wall Mounting Brackets:** P/N 4151768 or feature code #9450.

**SUPPLIES**

None required with machine order. Supplies may be ordered through IBM.

**3642 ENCODER PRINTER****PURPOSE**

A workstation printer and magnetic stripe encoder which produces turn around documents. The magnetic stripe on the documents encoded by the 3642 can be read by the Magnetic Hand Scanner and the Magnetic Slot Reader.

**MODEL 2**

Model 002: Has ten print lines and allows the automatic feeding of continuous forms as well as hand feed operation.

**Prerequisites:** A Loop Station Connector installed on an IBM Multi-use Communications Loop. See "Accessories".

**Note:** When ordering this machine for attachment to an 8100 system, the appropriate M8130, 8140 or 8101 pages titled "Terminal Requirements" should be reviewed. When ordering this machine for attachment to a 4331 system, the appropriate M4331 pages should be reviewed.

**Customer Setup:** Machine only. The 3642 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility. For additional information on CSU refer to the General Information section.

**HIGHLIGHTS**

The 3642 is designed to produce magnetic stripe documents at a workstation. Its capability includes:

- Prints and encodes magnetic striped cards and labels.
- Prints 10 lines of up to 70 alphanumeric characters each.
- Encodes alphanumeric data.
- Hand feed or automatic feed documents.
- Large printed-character option.

**Automatic Feeding And Bursting:** The Automatic Feed and Burst capability permits unattended operation. It provides a forms burster and a hopper which holds up to 400 continuous forms. A forms stacker which holds up to 400 cut forms is standard. All continuous forms are automatically burst prior to encoding and printing. The Automatic Feed and Burst capability is designed to burst 99 pound card stock and adhesive backed labels. It is not designed to burst 150-pound tag stock.

**Document Speed:** The document speed of the 3642 depends on the data printed and the forms size and will have to be evaluated for each application. The machine speed for a typical document is eight documents per minute.

**Document Description:** The 3642 contains a printer and magnetic stripe encoder that can print and encode on the following documents.

**Document Sizes:**

Height: 8.26cm (3.25 in.)  
Length, Min: 12.7cm (5.00 in.)  
Length, Max: 18.733cm (7.375 in.)

**Document Types:**

99 pound Card Stock  
150 pound White Tag Stock  
Pressure Sensitive Labels

**Document Thickness:**

Min.: 0.018cm (0.007 in.)  
Max.: 0.030cm (0.011 in.).

See "Forms Design Reference Guide", GA24-3488, for more details on the 3642 Encoder Printer forms.

**Character Sets:** The 48 printed character set consists of 0-9, A-Z, and appropriate special characters as defined by country requirements.

A Katakana character set is available at time of manufacture which will allow the printing of Katakana only on specified lines. See "Specify."

A special (Large Character) 48-character set available at time of manufacture provides 0-9, A-Z, slash (/), minus (-), and decimal (.), and 9 special characters for creating large printed characters. See "3630 Plant Communications System Description" for details. (Canada only) > The large character set has two options:

- Large-character printing on the first 4 lines only - normal character printing on the last 6 lines.
- Large-character printing on all 10 lines. <)

The 63-character magnetically encoded character set consists of 0-9, A-Z, and 27 special characters.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3642 at time of delivery or when relocating the 3642.
- Removing and packing of the 3642 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3642 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network (see "Accessories").

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** The standard maintenance agreement as described in the General Information section applies to the 3642 terminals.

Maintenance of the 3642 terminals will normally be performed at the installed location. See "Use of IBM Equipment in Industrial Environments" in GI section.

There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

**Physical Environment:** The 3642 may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments. It can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.

- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the "IBM 3630 Plant Communication System, Installation Manual - Physical Planning", GA24-3675.

**Publications:** "Forms Design Reference Guide for Printers", GA24-3488; "IBM 3630 Plant Communication System, System Description", GA24-3452; "Introduction to IBM 8100 Information System", GA27-2875; "Guide to the IBM 4331 Processor", GC20-1878; "IBM 4331/3640 Information Handbook"; "IBM 3642 Encoder Printer Operating Guide", GA24-3680.

## SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (120V AC, 1-phase, 60 Hz): #9890 for locking plug, or #9891 for non-locking plug.

(Canada only > Note: 120V AC is compatible with existing 115V AC systems. <)

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
220V #2813	120V #2802
240V #2801	

Note 1: 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

Note 2: A power cord and plug will be shipped from the plant of manufacture. The 3-digit WT A/FE country code in the DP machine order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the IBM 3630 Plant Communication System, Installation Manual-Physical Planning, GA24-3675.

- Power Plug: If #2802, #2804, or #2730 voltage is specified, then #2714 (non-locking plug) or #2715 (locking plug) must be specified.
- Power Cable:
  - 1.83m (6 ft) cable - #9986
  - 4.3m (14 ft) cable - #9987
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify #9976 for a 1.8m (6 ft) cable or #9977 for a 4.3m (14 ft) cable.
- Color: Classic blue - #9063; charcoal brown - #9064; pebble gray - #9065.
- Machine Nomenclature:

Canadian French #2935  
English US #2750  
Japanese #2930  
Portuguese (Brazil) #2933  
Spanish Speaking #2931

- Character Set Groups:

#2845 - EBCDIC  
#2955 - Japan  
#2956 - United States  
#2961 - Spanish Speaking  
#2970 - France

#2975 - Brazil  
#9402 - Large-Character lines 1-10

A Katakana feature will be available on the 3642 at time of manufacture only. It will allow the intermix of Katakana-only character set and the Japan character set. The following are available combinations:

#2774 - Katakana on line 1 only.  
#2775 - Katakana on line 1, 2, and 3.  
#2776 - Katakana on line 8, 9, and 10.  
#2777 - Katakana on line 2, 4, 6, 8, and 10.

Note: Line 1 is the top line.

If a customer desires other Katakana print line positions, an RPQ may be submitted at order time. RPQs to change print line positions will not be accepted after manufacture and shipment to the customer.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Loop Accessories:** A group of accessory products are offered to permit plant electricians or contract personnel to install the loops. Refer to IBM Multi-use Communications Loop Planning and Installation Guide, GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for Installation and Testing information.

**Loop Splice Plate (LSP):** The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

**Loop Station Connector (LSC):** The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

**2 X 4 Adapter Plate (2AP):** The 2" X 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the Loop Installation and Planning Guide. It is not to be used with the environmental outlet boxes.

**Loop Wiring Concentrator (LWC):** The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called radials. The point where a radial line terminates at the LWC is called an LWC port. Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

**Loop Surge Suppressor (LSS):** The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

**Continuity and Relay Tester:** The Continuity and Relay Tester is used with a customer supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories	P/N
Order via MES from Raleigh:	
Loop Splice Plate (LSP)	
(indoor)	1657300
Loop Station Connector	
(Radial LSC)	1657310
Loop Station Connector	
(Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order	
instead of LWC-1657330)*	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order	
instead of LSS-1657350) *	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys	
(10 spares) **	1657379
2 X 4 Adapter Plate (2AP)	7838771
Order via MES from Fujisawa:	
Conventional Box (indoor)	
5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to	
indoor box)	2100264
Environmental	

Box (outdoor) 7 x 11.5cm	
(2.75 x 4.5 inches)	
(For industrial use)	1657280
Environmental Clamp -	
small (for indoor cable	
to environmental box)	2114285
Environmental Clamp -	
large (for outdoor cable	
to environmental box)	1657377
Metric conduit	
adapter	1657292
Environmental Enclosure -	
NEMA - 4X 36 x 30 x 15cm	
(14 x 12 x 6 in.)	1657305
Environmental Enclosure	
Mtg Panel	1657306
Sealing - Locknut	1657307

\* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

\*\* 1 package (10 keys) shipped with each 3631. 1 key shipped with each LWC and wrap LSC.

**Ordering Instructions:** Order via MES from location indicated above. When ordering use Machine type 3631.

**Warranty:** All loop accessories are warranted free from defects of workmanship and materials for 90 days.

**Customer Responsibilities:** The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, contact IBM for details of IBM services available to assist the customer with installation. The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories. See "IBM Multi-use Communications Loop Planning and Installation Guide", (GA27-3341) for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops, it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

## SUPPLIES

None required with machine order. Supplies may be ordered through your IBM NDD Sales Representative for initial and replacement quantities.

## 3643 KEYBOARD DISPLAY

### PURPOSE

A combination keyboard and gas panel display terminal for input and output in interactive 3630 Plant Communication System applications and when attached to a 4331 processor or an 8100 system.

### MODELS

**Model 4 004:** Displays 1,024 characters -- 16 rows of 64 characters. Keyboard consists of alphanumeric, control, and function keys.

#### Prerequisites:

1. Either the Alphanumeric Keyboard (#4772) or the Expanded Alphanumeric Keyboard (#4774) must be selected to complete the order, see "Special Features".
2. A Loop Station Connector installed on an IBM Multiuse Communications Loop, see "Accessories".
3. Magnetic Reader Attachment (#4910) must be specified if either the Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader is to be attached.

When ordering this machine for attachment to an 8100 system, section "Terminal Requirements" in the appropriate M8130, 8140 or 8101 pages should be reviewed. When ordering this machine for attachment to a 4331 system the M4331 pages should be reviewed.

**Customer Setup (CSU):** Machine only. The 3643 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

### HIGHLIGHTS

- Gas panel display with buffer.
- Keyboard options to meet input requirements.
- Operates with manufacturing application programs.
- Accesses control functions.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3643 at time of delivery or when relocating the 3643.
- Removing and packing of the 3643 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3643 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network, see "Accessories".

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** Maintenance of the 3643 terminals will normally be performed at the installed location.

There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

**Physical Environments:** The 3643 may be used in industrialized work zones of a wide range of business, industrial and commercial establishments.

It can resist:

- Concentrations of certain common, corrosive gases.
- Concentrations of dust, grit and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with shipping, placement, operation and relocation of the terminal for most types of industries.

For environmental specifications refer to the "IBM 3630 Plant Communication System, Installation Manual - Physical Planning", (GA24-3675).

**Publications:** "IBM 3630 Plant Communication System, System Description", (GA24-3652) -- "Introduction to the IBM 8100 Information System", (GA27-2875) -- "Guide to the IBM 4331 Processor", (GC20-1878) -- "IBM 4331/3640 Information Handbook" -- "IBM 3643 Keyboard Display Operating Guide", (GA24-3681).

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- (Canada only > Voltage (120V AC, 1-phase, 60 Hz): #9890 for locking plug, or #9891 for non-locking plug. Note: 120V AC is compatible with existing 115V AC systems. <)
- (Except Canada > Voltage (AC, 1-phase):

50 Hz	60 Hz
100V - #2804	100V - #2730
220V - #2813	120V - #2802
240V - #2801	

Note 1: 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

Note 2: A power cord and plug will be shipped from the plant of manufacture. The 3-digit country code in the DP machine order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the IBM 3630 Plant Communication System, Installation Manual -- Physical Planning, GA24-3675.

- Power Plug: If #2802, #2804, or #2730 voltage is specified, then #2714 (non-locking plug) or #2715 (locking plug) must be specified. <)
- Power Cable:
  - 1.8m (6.0 ft) cable - #9986
  - 4.3m (14.0 ft) cable - #9987
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct

## MACHINES

attached or data link-attached loop. Specify #9976 for a 1.8m (6.0 ft) cable or #9977 for a 4.3m (14.0 ft) cable.

- Color: Classic blue #9063 -- charcoal brown #9064 -- pebble gray #9065.
- Machine Nomenclature:
 

Canadian		Portuguese	
French	#2935	(Brazil)	#2933
English US	#2750	Spanish	
Japanese	#2930	Speaking	#2931
- Keyboard Character Set:
 

Brazilian	#2975	Japanese	
English US	#2956	Katakana	#2973
French	#2970	Spanish	
		Speaking	#2961

## SPECIAL FEATURES

**Keyboards** -- All keyboards will have a combination of preengraved and non-engraved keytops. For the non-engraved function keys, each 3643 will be provided with three sets of self-adhesive keytop labels. One set will be preprinted with commonly-used function nomenclature and will have a protective plastic coating applied. Also, a set of blank labels will be provided so that the user may create his own labels. A clear plastic overlay set will provide a protective cover for the blank label set.

**Alphameric Keyboard (#4772):** A 54 key-character alphameric section pre-engraved as a typewriter keyboard to the left of a function/transaction keypad. (77 keys in Japan, 74 keys in other languages.) Limitations: Cannot be installed with Expanded Numeric Keyboard (#4774). Maximum: One. Field Installation: No.

**Expanded Alphameric Keyboard (#4774):** Same as #4772; except that function/transaction keypad has 20 additional non-engraved keys (15 for Japan). Limitations: Cannot be installed with keyboard (#4772). Maximum: One. Field Installation: No.

**Magnetic Attachment (#4910):** Permits attachment of Magnetic Hand Scanner or Magnetic Slot Reader. The Magnetic Hand Scanner, Magnetic Slot Reader and Dual Entry Magnetic Slot Reader are plug compatible. Limitations: Cannot be installed with Magnetic Badge and Document Encoder (#4920). Maximum: One. Field Installation: Yes.

**Magnetic Badge And Document Encoder (#4920):** Provides a magnetic slot reader/encoder unit that records alphameric data on magnetic striped badges and documents. Also has the capability to read data from magnetic striped media. Limitations: Cannot be installed with Magnetic Attachment (#4910). Maximum: One on mdl 2, 3 or 4. Field Installation: Yes, on machines shipped after September 1981.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Magnetic Hand Scanner:** P/N 4123495

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic

reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

Ordering Instructions: See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures. The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days. In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a time-and-material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time-and-materials basis at the Repair Center. Authorization Form #2110 applies.

**Magnetic Slot Reader:** P/N 4123500 or Feature Code #9441.

**Dual Entry Magnetic Slot Reader:** P/N 4123520 or Feature Code #9442.

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

Ordering Instructions: See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers      Number of Spares

50	2
100	3
150	4
200	5

Warranty: The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form, #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a time-and-material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time-and-materials basis at the Repair Center. Authorization Form #2110 applies.

Note: A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

#### Magnetic Reader/Scanner Extension Cables

These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available. See RPQ Reference List. MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days. Limitation: Extension cables cannot be plugged into other extension cables.

Ordering Instructions: See IBM.

Cable 6.0m (19.7 ft): P/N 4832986

Cable 12.0m (39.4 ft): P/N 4832987

#### Magnetic Reader/Scanner Replacement Assemblies

Description	P/N
MHS Sensor Head Assembly	4832721
MHS Handle and Feedback Assembly	4832701
MHS Amplifier Card and Cable Assembly	4832727
DEMSR/MSR Arm and Sensor Head Assembly	4832963
DEMSR/MSR Base and Feedback Assembly	4832973
DEMSR/MSR Amplifier Card and	

Cable Assembly	4832962
MSR Cover	4832964
DEMSR Cover	4123486

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

#### Magnetic Hand Scanner

Number of MHSs	Sensor Head Assembly	Handle and Fdbk Assembly	Amp Card and Cord Assembly
#4123495	#4832721	#4832701	#832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

#### Magnetic Slot Reader

Number of MSRs	Arm and Sensor Head Assembly	Base and Feedback Assembly	Amp Card and Cord Assembly
#4123500	#4832963	#4832973	#832962
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

Customer may need one (1) replacement for Cover (#4832964)

#### Dual Entry Magnetic Slot Reader

No. of DEMSRs	Arm and Sensor Head Assembly	Base and Feedback Assembly	Amp Card and Cord Assembly
#4123520	#4832963	#4832973	#4832962
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

Customer may need one (1) replacement for cover (#4123486)

Ordering Instructions: See IBM.

Warranty: Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

#### SUPPLIES (NONE)



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MACHINES

M 3644.1

Sep 83

Major Revision

## 3644 AUTOMATIC DATA UNIT

### PURPOSE

The 3644 Automatic Data Unit attaches to the 3631 or 3632 controller, an 4331 MDL Group 1 or 2 or an 8100 system via their loop features to provide system connection to a variety of distributed sensors, actuators, and production and laboratory equipment.

### MODELS

#### Model 1 001

**Limitations:** The analog input function requires multiple Sensor I/O cards. If analog input or current loop is installed, some card-socket usage restrictions exist. The Analog Amplifier card should be installed only in 3644s containing the necessary prerequisite EC. Analog input and RS232C/CCITT V.24 Communications cannot both be installed in the same 3644. The Communications Adapter Card is not supported by the 3630 host services 3644 translation services program. See M10000 pages for details.

#### Prerequisites:

1. When the 3644 is installed on the 8100 system via the IBM Multiuse Communications Loop, the 8100 system will generate the parameter tables.

**Note:** When ordering this machine for attachment to an 8100 system, the appropriate 8101, 8130 or 8140 pages titled "Terminal Requirements" should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

2. A Loop Station Connector installed on an IBM Multiuse Communications Loop. See "Loop Accessories" in the 3630 or 8100 machine pages.

3. When the 3644 is installed on the 4331 Loop Adapter the 4331 processor will generate the parameter tables.

**Customer Setup:** Machine only.

### HIGHLIGHTS

Provides:

- Power and housing for Sensor I/O cards
- Distributed attachment of user equipment
- Analog and digital attachments
- Bit serial asynchronous current loop and RS232C/CCITT V.24/V.28
- User-defined scan controls, data transmission and logic processing.

**Customer Setup:** The 3644 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3644 at time of delivery or when relocating the 3644; this includes the Sensor I/O cards.
- Removing and packing of the 3644 at time of discontinuance.
- Using and following the problem determination procedures of the 3644 and filling out the trouble report prior to calling for service.
- Executing the problem determination procedures for the Sensor I/O cards, determining the failing card, and mailing it to the honoring IBM location.
- ✓ Maintenance of the process sensors, actuators, and wiring.
- Determining requirements for and stocking spare Sensor I/O cards.
- Creating the parameter tables that direct the operation of the 3644.
- Installation and physical planning for the 3644. IBM assistance in determining the suitability of the industrial environment for the 3644 installation is available.
- Relocation of the 3644 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network.

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.

- Whether terminal, loop, controller, or sensor I/O cards are at fault.
- Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** Maintenance of the 3644 terminals will normally be performed at the installed location. There is no regularly scheduled IBM preventive maintenance.

Warranty service of the Sensor I/O cards will be performed at the honoring IBM location.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

#### Physical Environments:

The 3644 mdl 1 and its Sensor I/O cards may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the and *IBM 3630 Plant Communication System, Installation Manual - Physical Planning*, GA24-3675.

#### Publications:

*IBM 3630 Plant Communication System, System Description*, GA24-3652.

*Introduction to the IBM 8100 Information System*, GA27-2875.

*Guide to the IBM 4331 Processor*, GC20-1878

*IBM 4331/3640 Information Handbook*

*IBM 3644 Automatic Data Unit, Component Description*, GA24-3653

*IBM 3644 Automatic Data Unit Programming Guide*, GC24-5178

*IBM 3644 Automatic Data Unit Operating Guide*, GA24-3682

### SPECIFY

Unless otherwise indicated, these specify features are only available at of manufacture.

(Canada only+)

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

**Note:** 120V AC is compatible with existing 115V AC systems. +)

(Except Canada+)

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V - <b>#2804</b>	100V - <b>#2730</b>
220V - <b>#2813</b>	120V - <b>#2802</b>
240V - <b>#2801</b>	

**Note 1:** 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

**Note 2:** A power cord and plug will be shipped from the plant of manufacture. The 3-digit country code in the DP machine order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the *IBM 3630 Plant Communication System, Installation Manual- Physical Planning*, GA24-3675. +)

- Power Plug: If **#2802**, **#2804**, or **#2730** voltage is specified, then **#2714** (non-locking plug) or **#2715** (locking plug) must be specified.
- Power Cable:
  - 1.8 meter (6 foot) cable - **#9986**
  - 4.3 meter (14 foot) cable - **#9987**
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct

**3644 Automatic Data Unit (cont'd)**

attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.

- Color: Classic blue - **#9063** ... charcoal brown - **#9064** ... pebble gray - **#9065**.
- Machine Nomenclature:
 

Canadian French <b>#2935</b>	Portuguese (Brazil) <b>#2933</b>
English <b>#2750</b>	Spanish Speaking <b>#2931</b>
Japanese <b>#2930</b>	
- Distribution of 3644 Microcode: The 3644 microcode is required at each S/370, 4331 or 8100 system location. The address for the initial shipment must be supplied as shown below.

The following four steps are to be taken when ordering 3644 microcode:

- 1) To identify what the 3644 is attached to specify:  
**#9415** - when attached to 8100  
**#9416** - when attached to 3631, 3632  
**#9417** - when attached to 4331 Loop Adapter
- 2) To specify the desired media when attached to a 3631, 3632, or 4331 Loop Adapter specify:  
**#9412** - 9/800 magnetic tape  
**#9413** - 9/1600 magnetic tape  
**#9414** - 9/6250 magnetic tape
- 3) To indicate the presence of the MIO feature (**#4905**) when attached to a 3631, 3632, or 4331 loop adapter, specify:  
**#9491** - for initial 3644 on the system without MIO feature  
**#9492** - for initial 3644 on the system with MIO feature (**#4905**).  
**#9493** - for any additional 3644s on the system.
- 4) For 3644's attached to an 8100 specify:  
**#9493** - for any additional 3644s.  
**#9494** - for the first 3644

Shipping address for 3644 microcode must be supplied exactly as follows:

**Note:** When ordering the first 3644 and it is remote from the host, specify **#9596**.

1. When the host is not an 8100 system, send to the host (for example, S/370) location:

Line 1 - IBM Programming Support Representative  
Line 2 - c/o (Customer Name)  
Line 3 - Street Address (or P.O. Box)  
Line 4 - City, Country, Postal Code  
Line 5 - Attention: Data Processing Manager

2. When the host is an 8100 system, send to the 8100 location:

Line 1 - Customer Name  
Line 2 - Street Address (or P.O. Box)  
Line 3 - City, Country, Postal Code  
Line 4 - Attention: Data Processing Manager

**SPECIAL FEATURES**

**Manual I/O (#4905):** Provides a 22-character display and a 35-key numeric/function keypad. Allows inquiry into customer data and status contained in 3644 storage when online to the 3630, 4331 or 8100 system. When offline, additionally allows modification of customer data locations to effect operator control of 3644 operation. **Maximum:** One. **Field Installation:** Not recommended.

**TERMS and CONDITIONS**

Plan Offering: Plan B  
Purchase Option: 55%  
Machine Group: D  
Warranty: B  
Per Call: 1

Termination Charge Percent 20%  
Termination Plan Months: 6  
Pre-Installation Test Allowance: 4  
hours On-site Test Allowance: 3  
weeks

**MODEL CONVERSIONS (None)**
**ACCESSORIES**
**SENSOR I/O CARDS**

**16-Point Non-Isolated DI:** Provides 16 non-isolated input points for connection to user voltage or contact sense signals. Each point provides a high level and a low level sense capability. Input parameters are:

Contact Sense	Low Level	High Level
Logical 1	≤ 2K Ohms	≤ 5K Ohms
Logical 0	≥ 50K Ohms	≥ 100K Ohms
Voltage Sense	Low Level	High Level
Logical 1	- 24.0 to + 1.0V DC	0 to + 9.0V DC
Logical 0	+ 2.5 to + 24.0V DC	+ 22.5 to + 52.8V DC

**16-Point Isolated DI:** Provides 16 points of optically isolated digital input for connection to user signals. 250V DC isolation is provided between user signals and the 3644. Each point provides a high level and a low level voltage - sense capability. Input parameters are:

	Low Level	High Level
Logical 1	+ 2.0 to +12.0V DC	+12.0 to +52.8V DC
Logical 0	- 12.0 to + 0.8V DC	- 52.8 to + 0.8V DC

**16-Point Non-Isolated DO:** Provides 16 NPN transistor switches in a grounded emitter configuration for switching user-provided DC power to user-provided devices. Each switch is capable of sinking .250 amps from a 52.8 volt source through a resistive load. A logical 1 written into the control register will cause the transistor to turn on. Maximum voltage drop in the on state is 0.4 volts at load currents up to 20 milliamperes and 0.6 volts at load currents up to .250 amps. If no user voltage source is attached, the card will supply an off state voltage of 5.5 volts maximum at 0 amps, and 2.4 volts minimum at .001 amps.

**16-Point Isolated DO:** Provides 16 NPN transistor switches in an open collector, open emitter configuration for switching user-provided DC power to user-provided devices. 250V DC or peak AC isolation is provided between each switch and the 3644. Each transistor switch is capable of switching up to .250 amp from a 52.8 volt source to a resistive load. A logical 1 written into the control register will cause the switch to turn on. Maximum voltage drop in the on state is 0.4 volts at load currents up to 20 milliamps and 0.6 volts at load currents up to 250 milliamps. Consult *3644 Component Description Manual* for limitations on the number of Isolated DO cards per 3644.

**Analog/Digital Converter:** Provides an 11-bit plus sign (12 bit total), 5 volt bi-polar successive approximation analog to digital converter with a zero correction logic section that reduces errors caused by component aging and temperature induced offset drift. Note that the ADC must be used in conjunction with at least one multiplexer card to provide for connection of signal wires. Additional multiplexer cards may be installed to provide a greater multiplexing capability. The ADC card must be installed in the 3644 card socket 1 if it is used. Analog Input Subsystems cannot be installed if Communication Adapter Card(s) are installed.

**Analog 7 Range Amplifier:** Provides a 7 range programmable gain instrumentation amplifier for low level analog input signals. Gains of 1, 10, 25, 50, 100, 250 or 500 may be selected for each analog input point. This extends the range of the ADC to ±10mv, ±20mv, ±50mv, ±100mv, ±200mv, ±500mv or ±5v full scale. The Analog Amplifier also converts the 16-point Solid State Multiplexer card from single ended to differential operation. The Analog Amplifier must be installed in Socket 2 if it is used.

The Analog Amplifier should be installed only in 3644's having the prerequisite noise reduction EC's. These EC's are factory installed in 3644's starting at Serial 0010077. Earlier 3644's may be upgraded with field installable EC 755840.

**Note:** A calibration tool to aid in ADC and Analog Amplifier calibration is available as RPQ S00399.

**8-Point Reed Relay Multiplexer:** Provides eight 3-wire connections for shielded differential analog input signals. Provides eight-way multiplexing for the ADC. Flying capacitor switching is used to provide + or - 200 volt common mode tolerance and reduce the influence of common mode voltage to unmeasurable levels at reference conditions. The reed relay multiplexer can switch signal voltages ranging from -0.5 to +5 volts. Multiplexer cards must be installed in contiguous socket locations, starting with socket 2 if no Analog Amplifier is installed, or with socket 3 if an Analog amplifier is installed. Reed Relay and Solid State Multiplexers may be intermixed.

**3644 Automatic Data Unit (cont'd)**

**16-Point Solid State Multiplexer:** Provides sixteen 3-wire connections for shielded analog input signals. Provides 16-way multiplexing for the ADC. Solid state FET switches can handle signals ranging from -5 to +5 volts. If used without the Analog Amplifier, single ended operation is provided with the analog signals referenced to 3644 ground. If used with the Analog Amplifier, differential input operation is provided with a common mode tolerance of  $\pm 10$  volts. Multiplexer cards must be installed in contiguous socket locations, starting with socket 2 if no Analog Amplifier is installed, or with socket 3 if an Analog Amplifier is used. Reed Relay and Solid State Multiplexers may be intermixed.

**Current Loop Receiver/Transmitter:** Provides two transmitters and two receivers for modulating and demodulating a 20 milliamp current flow. Switches are provided on the card to select speed (110, 150, 300, 600, 1200 baud), number of data bits (5, 6, 7, 8), parity (odd, even, none), and number of stop bits (1, 2). A variety of start/stop codes over a wide range of speeds is available to allow connection to bit-serial devices. Consult the *3644 Component Description Manual* for limitations on the number of Current loop cards per 3644.

**Communications Adapter:** Provides two bidirectional asynchronous RS-232-C/CCITT V.24/V.28 compatible attachment points for RS-232/CCITT V.24/V.28 compatible terminal equipment. Switches are provided on the card to select speed (110/134.5, 150, 300, 600, 1200 Baud), number of data bits (5, 6, 7, 8) parity (odd, even, none), and number of stop bits (1, 1.5, 2). 3644 support is provided for simplex, half duplex, and duplex channel configurations. The Communications Adapter Card cannot be installed in 3644's using the Analog Input Subsystem. The Communications Adapter Card is not supported by the 3630 Host Services 3644 Translation Services program.

**FEATURE SUMMARY**

Description	P/N
16-Point Non-Isolated DI Card	4152582
16-Point Isolated DI	4152581
16-Point Non-Isolated DO	4152583
16-Point Isolated DO	8333198
Analog/Digital Converter(ADC)	4152586
Analog 7 Range Amplifier	4152587
8-Point Reed Relay Multiplexer	4152584
16-Point Solid State Multiplexer	4152585
Current Loop	
Receiver/Transmitter	4152580
Communications Adapter	5680857

**Ordering Instructions:** For ordering for delivery with machine, see appropriate "Machines" pages.

**Warranty:** Each 3644 Sensor I/O card is warranted to be free from defects in materials and workmanship for a period of 90 days, starting either on date of shipment or on date of installation or 45 days after installation, whichever comes first. IBM at its option will repair or replace the defective accessory.

Warranty will be honored at the IBM Branch Office, except in Canada. The customer is responsible for executing the problem determination procedures for the Sensor I/O cards and determining the failing card. In Canada, the customer mails the Sensor I/O card to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7  
Canada

Cards that have been modified and cards that have been damaged through improper installation, handling, or failure to provide a suitable installation environment will not be accepted for warranty service. IBM shall be the sole judge of whether or not a card meets warranty requirements.

Spare unit requirements are a function of the customer's application, the total number of 3644s installed, and the range of Sensor I/O card types installed. Spare unit stocking considerations are:

- At least one spare for each type of Sensor I/O card installed at a customer site.
- Where multiples of a single Sensor I/O card are installed, one spare for each eight active cards.

Each customer will have to determine his own unique spare requirements.

**SENSOR I/O CARDS ATTACHMENT ACCESSORIES**

**Process Termination Block:** Attaches to the end of the Sensor I/O card to provide a screw-down termination facility for process signals and to retain the card in the 3644 housing. Each installed card with the exception of the analog-digital converter must be equipped with a process termination block.

**Accessory Socket Cover:** Covers unused sensor card locations in the 3644 to minimize entry of airborne contaminants. One cover is required for each unused sensor card location. A cover is also used to retain the ADC.

**Communications Adapter Cable:** Provides translation at the 3644 process termination block to a standard EIA connector. The Adapter Cable is 20 inches (508 cm) long with ring connectors on one end and a female EIA DB-25 connector on the other end.

Description	P/N
Process Termination Block	4152588
Accessory Socket Cover	4152589
Communications Adapter Cable	5680861

**Ordering Instructions:** For ordering for delivery with machine, see appropriate "Machines" pages. A

**Warranty:** The 3644 Attachment Accessories are warranted free from defects in workmanship and materials for 90 days.

**SUPPLIES (None)**

## 3645 PRINTER

### PURPOSE

A receive-only printer for printed output in interactive 3630 Plant Communication System, 4331 processor and 8100 Information System applications.

### MODELS

**Model 1 001** 120 cps maximum bidirectional printer  
Note: Actual printer throughput is dependent on system and application characteristics.

**Customer Setup:** Machine only.

**Prerequisites:** A Loop Station Connector installed on an IBM Multiuse Communications Loop. See "Loop Accessories" in the 3630 and 8100 machine pages.

Either Character Print - Standard (#1501) or Character Print - Large (#1502) must be specified.

Note: When ordering this machine for attachment to an 8100 system, the appropriate M8130, 8140 or 8101 pages titled "Terminal Requirements" should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

### HIGHLIGHTS

The 3645 Printer provides a hard-copy output on a variety of forms to meet plant floor printing requirements. The printer is a bidirectional matrix printer with electronic tabulation and indexing. Line spacing is 6 lines per inch. Up to 4 part cut forms can be used with standard friction feed. For continuous forms, the Forms Tractor (#8700) or the Forms Tractor with Separator Bar (#8701) is recommended. Card stock forms are not recommended.

Two printing feature options are provided:

Character Print - Standard (#1501) provides a basic character size printing (approximately 0.072 inch wide by 0.117 inch high). The printer character dot matrix is four of seven wide by eight high giving high legibility. The maximum print line is 132 positions. Character spacing is ten to the inch.

Character Print - Large (#1502) provides four character size printing options under program control:

Basic character size (approximately 0.072 inch wide by 0.117 inch high), and approximately two times basic size, four times basic size, and eight times basic size.

Intermix of printing sizes on a single line is not permitted.

The 3645 has been designed to operate in most industrial and commercial environments. The 3645 attaches to the 3631 or 3632 Plant Communication Controller via a local 9600 bps loop. The 3645 also attaches to the 3842 or 3843 Loop Control Unit via a 2400 bps loop, 4331 Loop Adapter or 8100 system loop.

Two variable width forms tractors are available. See "Special Features".

**Forms Specification:** Refer to *Form Design Reference Guide for Printers*, GA24-3488. (Use 3767 specifications.)

**Customer Setup:** The 3645 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup, and checkout of the 3645 at the time of delivery or when relocating the 3645.
- Removing and packing of the 3645 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3645 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network.

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** Maintenance of the 3645 Printer will normally be performed at the installed location. There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

Maintenance courses are offered to the customer for a separate charge.

**Physical Environments:** The 3645 Printer may be used in industrialized work zones of a wide range of business, industrial, and commercial establishments.

It can resist:

- Concentration of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.
- Vibration and shock associated with shipping, placement, operation, and relocation of the terminal for most types of industries.

For environmental requirements refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning*, GA24-3675.

### Publications:

*IBM 3630 Plant Communication System, System Description*, GA24-3652  
*Introduction to the IBM 8100 Information System*, GA27-2875  
*Guide to the IBM 4331 Processor*, GC20-1878  
*IBM 4331/3640 Information Handbook*  
*IBM 3645 Printer Operating Guide*, GA24-3711

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

(Canada only-)

- Voltage (120V AC, 1-phase, 60 Hz): #9890 for locking plug, or #9891 for non-locking plug.

Note: 120V AC is compatible with existing 115V AC systems. +)

(Except Canada+)

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V - #2804	100V - #2730
220V - #2813	120V - #2802
240V - #2801	

Note 1: 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

Note 2: A power cord and plug will be shipped from the plant of manufacture. The 3-digit country code in the DP machine order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the *IBM 3630 Plant Communication System, Installation Manual- Physical Planning*, GA24-3675.

- Power Plug: If #2802, #2804, or #2730 voltage is specified, then #2714 (non-locking plug) or #2715 (locking plug) must be specified. +)
- Power Cable:
  - 1.8 meters (6 foot cable) - #9986
  - 4.3 meters (14 foot cable) - #9987
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify #9976 for a 1.8 meter (6 foot) cable or #9977 for a 4.3 meter (14 foot) cable.
- Color: Classic blue - #9063 ... charcoal brown - #9064 ... pebble gray - #9065.
- Language Groups:
  - EBCDIC #2845
  - International #2950
  - Spanish speaking #2961
  - Japan (Katakana) #2973

**3645 Printer (cont'd)**Japan English #2955  
English US #2956Brazil #2975  
Canadian French #2977

## • Machine Nomenclature:

English US #2750  
Japanese #2930  
Spanish Speaking #2931Portuguese (Brazil) #2933  
Canadian French #2935**SPECIAL FEATURES**

**Character Print - Standard (#1501):** Provides dot matrix character size approximately 0.072 inch wide by 0.117 inch high at 10 characters per inch. **Limitations:** Cannot be installed with Character Print - Large (#1502). **Maximum:** One. **Field Installation:** Yes.

**Character Print - Large (#1502):** Provides four character size printing options under program control: Standard—approximately 0.072 inch wide by 0.117 inch high at 10 characters per inch, and approximately two times standard size, four times standard size, and eight times standard size. Intermix of printing sizes on a single line is not permitted. **Limitations:** Cannot be installed with Character Print - Standard (#1501). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #8700 or #8701.

**Variable Width Forms Tractor (#8700):** A forms feeding device for continuous edge-punched fan-fold forms. Up to 6 parts (total thickness - 0.46mm (0.018 inch) may be used. Five and six part continuous forms should be tried on an individual basis for acceptable feeding, registration, and print quality. Overall forms width from 76mm to 381mm (3 to 15 inches) can be fed. End of forms detection is provided. **Maximum:** One. **Field Installation:** Yes. **Note:** If this feature is ordered by MES, you must specify color #9063 classic blue, #9064 charcoal brown, #9065 pebble gray.

**Variable Width Forms Tractor With Separator (#8701):** Forms feeding device for continuous edge punched fan-fold forms. A separator bar permits tearing off continuous forms at the perforation to within 40mm (1.5 inches) of the top printing line without misalignment of subsequent forms. Forms should have perforated carrier strips on both sides. Up to 4 part continuous forms total thickness 0.3mm (0.012 inch) may be used. Forms without perforated carrier strips and/or greater than 4 parts are not recommended. Form widths from 127mm to 378mm (5 to 14-7/8 inches) can be used. End of forms detection is provided. **Maximum:** One. **Field Installation:** Yes. **Note:** If this feature is ordered by MES, you must specify color #9063 classic blue, #9064 charcoal brown, #9065 pebble gray.

**TERMS and CONDITIONS**Plan Offering: Plan B  
Purchase Option: 55%  
Machine Group: D  
Warranty: B  
Per Call: 1Termination Plan Months: 6  
Customer Setup: Yes

Termination Charge Percent: 20%

**MODEL CONVERSIONS (None)****ACCESSORIES**

**Forms Stand (#4450):** Permits placement of continuous forms on the stand above floor level and provides for stacking after printing. This accessory is a two-shelf forms stand.

**SUPPLIES**

None required with machine order. Supplies may be ordered through your DP Supply Function for initial and replacement quantities.

## 3646 SCANNER CONTROL UNIT

### PURPOSE

The 3646 Scanner Control Unit allows attachment of the Magnetic Hand Scanners or the Magnetic Slot Readers for rapid, accurate data collection.

### MODELS

The standard 3646 can attach up to two magnetic readers, Magnetic Hand Scanners or Magnetic Slot Readers. Two additional magnetic readers can be attached via the optional Magnetic Reader Attachment (#6351). Each magnetic reader can be addressed for independent operation.

**Prerequisites:** A Loop Station Connector installed on an IBM Multiuse Communications Loop, see "Accessories" Magnetic Hand Scanner, Magnetic Slot Reader or Dual Entry Magnetic Slot Reader.

**Note:** When ordering this machine for attachment to an 8100 system, "Terminal Requirements" on the appropriate M8130, 8140 or 8101 pages should be reviewed. When ordering this machine for attachment to a 4331 system the appropriate M4331 pages should be reviewed.

**Customer Setup (CSU):** Machine only.

### HIGHLIGHTS

The 3646 is a compact terminal designed to bring magnetic scanning capability to the workstation. Its capability includes:

- Free standing on a table, counter, work bench, etc.
- Wall or column mounted via accessory brackets.
- Up to 4 magnetic readers.
- Readers can be Magnetic Hand Scanners or Magnetic Slot Readers in any combination.

**Customer Setup:** The 3646 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup and checkout of the 3646 at time of delivery or when relocating the 3646. A Magnetic Hand Scanner or Magnetic Slot Reader is required for checkout.
- Removing and packing of the 3646 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3646 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network, see "Accessories".

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs) prompt retry and recovery actions and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** Maintenance of the 3646 terminals will normally be performed at the installed location.

For maintenance of 3646 accessories, see "Accessories".

There is no regularly scheduled IBM preventive maintenance.

If purchased, the terminals are eligible for maintenance coverage immediately following expiration of the warranty period at a monthly charge.

**Physical Environments:** The 3646 mdl 1 and accessories may be used in the industrialized work zones of a wide range of business, industrial and commercial establishments.

They can resist:

- Concentrations of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with terminal operational sites.

- Vibration and shock associated with the shipping, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Plant Communication System, Installation Manual - Physical Planning*, GA24-3675.

### Publications:

*IBM 3630 Plant Communication System, System Description*, GA24-3652

*Introduction to the IBM 8100 Information System*, GA27-2875

*Guide to the IBM 4331 Processor*, GC20-1878

*IBM 4331/3640 Information Handbook*

*IBM 3646 Scanner Control Unit Operating Guide*, GA24-3683

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

(Canada only+)

- Voltage (120V AC, 1-phase, 60 Hz): #9890 for locking plug, or #9891 for non-locking plug.

**Note:** 120V AC is compatible with existing 115V AC systems. +)

(Except Canada+)

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V - #2804	100V - #2730
220V - #2813	120V - #2802
240V - #2801	

**Note 1:** 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

**Note 2:** A power cord and plug will be shipped from the plant of manufacture. The 3-digit country code in the DP machine order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the *IBM 3630 Plant Communication System, Installation Manual- Physical Planning*, GA24-3675.

- Power Plug: If #2802, #2804, or #2730 voltage is specified, then #2714 (non-locking plug) or #2715 (locking plug) must be specified. +)
- Power Cable:
  - 1.83 meter (6 foot) cable - #9986
  - 4.27 meter (14 foot) cable - #9987
- Communication Cable: A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify #9976 for a 1.8 meter (6 foot) cable or #9977 for a 4.3 meter (14 foot) cable.
- Color: Classic blue - #9063 ... charcoal brown - #9064 ... pebble gray - #9065.
- Machine Nomenclature:
 

English US #2750	Spanish Speaking #2931
Japanese #2930	Portuguese (Brazil) #2933
Canadian French #2935	

### SPECIAL FEATURES

**Magnetic Reader Attachment (#6351):** Allows two additional Magnetic Hand Scanners, Magnetic Slot Readers or Dual Entry magnetic Slot Readers to be attached to the 3646 mdl 1. **Maximum:** One. **Field Installation:** Yes.

### TERMS and CONDITIONS

Plan Offering: Plan B	Termination Plan Months: 6
Purchase Option: 55 %	Educational Allowance: No
Machine Group: A	Pre-Installation Test Allowance
Warranty: B	None
Per Call: 1	
Termination Charge Percent: 20 %	

### MODEL CONVERSION (None)

**3646 Scanner Control Unit (cont'd)**
**ACCESSORIES**
**MAGNETIC HAND SCANNER**

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

**Ordering Instructions:** See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form #2110*, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. "Authorization Form #2110" applies.

**Magnetic Hand Scanner:** P/N 4123495.

**MAGNETIC SLOT READER  
MAGNETIC SLOT READER, DUAL ENTRY**

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

**Ordering Instructions:** See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head

assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form #2110*, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. "Authorization Form #2110" applies.

A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

**Magnetic Slot Reader:** P/N 4123500 or feature code #9441.

**Dual Entry Magnetic Slot Reader:** P/N 4123520 or feature code #9442.

**MAGNETIC READER/SCANNER EXTENSION CABLES**

These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

**Limitation:** Extension cables cannot be plugged into other extension cables. @SS@

**Cable 6 meters (19.7 feet):** P/N 4832986.

**Cable 12 meters (39.4 feet):** P/N 4832987.

**MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES**

Description	P/N
MHS Sensor Head Assembly	4832721
MHS Handle and Feedback Assembly	4832701
MHS Amplifier Card and Cable Assembly	4832727
DEMSR/MSR Arm and Sensor Head Assembly	4832963
DEMSR/MSR Base and Feedback Assembly	4832973
DEMSR/MSR Amplifier Card and Cable Assembly	4832962
MSR Cover	4832964
DEMSR Cover	4123486

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking:

Magnetic Hand Scanner			
Number of MHSs # 4123495	Sensor Head Assemblies # 4832721	Handle and Feedback Assembly # 4832701	Amplifier Card and Cord Assembly # 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

**3646 Scanner Control Unit (cont'd)**
**Magnetic Slot Reader**

Number of MSRs # 4123500	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Dual Entry Magnetic Slot Reader**

Number of DEMSRs # 4123520	Arm and Sensor Head Assembly # 4832963	Base and Feedback Assembly # 4832973	Amplifier Card and Cord Assem # 4832962	Cover # 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Ordering Instructions:** See IBM.

**Warranty:** Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**WALL MOUNTING BRACKETS**

A two piece mounting bracket is available to mount the 3646 Scanner Control Unit to a wall, column, or other vertical surface.

One piece mounts on the 3646 and the other mounts on the vertical surface. There are four bracket holes on the back of the 3646 and four mounting screws supplied with the brackets. The customer is responsible for supplying the fasteners for the wall bracket.

**Ordering Instructions:** See IBM.

**Warranty:** Wall mounting brackets are warranted free from defects of workmanship and materials for 90 days.

**Wall Mounting Brackets:** P/N 4151768 or feature code #9450.

**SUPPLIES (None)**

## 3647 TIME AND ATTENDANCE TERMINAL

### PURPOSE

A data entry terminal designed for attendance and other data entry labor reporting applications.

### MODELS

**Model 1 001**

**Prerequisites:** A loop station connector installed on an IBM Multiuse Communications Loop. For magnetic stripe reading, a Magnetic Slot Reader, Dual Entry Magnetic Slot Reader, or a Magnetic Hand Scanner is required.

When ordering this machine for attachment to a 4331 processor the appropriate M4331 pages should be reviewed.

**Customer Setup(CSU):** Machine only.

### HIGHLIGHTS

The 3647 Time and Attendance Terminal is designed for attendance, labor reporting, and other data entry applications. The base 3647 has a magnetic scanner adapter and a four-digit display that can be used for time of day. Two optional features are available:

- **Function Switch** - A six-position rotary switch that is customer definable.
- **Control Feature** - Provides control signals to allow door openings, audible alarms, etc.

An optional magnetic slot reader mounting bracket accessory (P/N 8632451) provides attachment for a slot reader. This mounting bracket is firmly attached to the 3647 via a keylock. The slot reader cable is coiled within the bracket.

The 3647 can be table- or wall-mounted. An optional wall mounting bracket accessory (P/N 4151768) is available.

The 3647 provides:

- **Time of Day Clock** - The initial time is set under program control and can be set for a 12- or 24-hour clock with time displayed in hours and minutes or hours and hundredths of hours.
- **Input Buffer** - An input buffer mode of operation can be selected to store multiple input messages. This provides a high walk-by rate and allows input when the controller, loop, or data link is inoperative. A no-buffer mode of operation can also be selected to permit interactive processing on each input message.
- **Invalid Document Code** - An invalid document code option can be selected that allows input messages to be checked for the presence of a non-numeric character. Input without this character is rejected by the 3647.
- **Time Stamping** - A time stamping option can be selected that sends the displayed time of day with each input message transmitted to the controller.

**Customer Setup:** The 3647 is designated customer setup (CSU) thereby offering the customer early availability and relocation flexibility.

**Customer Responsibilities:** The customer is responsible for:

- Unpacking, placement, setup, and checkout of the 3647 at the time of delivery or when relocating the 3647.
- Removing and packing of the 3647 at time of discontinuance.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for service.
- Relocation of the 3647 (if required) to allow IBM service access.
- Procurement, installation and maintenance of the loop network, see "Accessories".

**Problem Determination Procedures:** Terminal problem determination procedures (PDPs), prompt retry and recovery actions, and the analysis of operations to determine:

- Whether or not continued operation is possible.
- Whether terminal, loop, controller, accessory, or media is at fault.

Proper terminal operator use of PDPs will result in maximum terminal and system availability.

**Maintenance:** The standard maintenance agreement as described in the General Information section applies to the 3647 Time and Attendance Terminal; however, there is no regularly scheduled IBM preventive

maintenance. Maintenance of the 3647 Time and Attendance Terminal will normally be performed at the installed location. If purchased, the terminals are eligible for Maintenance Agreement service immediately following expiration of the warranty period.

**Physical Environments:** The 3647 Time and Attendance Terminal may be used in industrialized work areas of a wide range of business, industrial, and commercial establishments.

It can resist:

- Concentration of certain common, corrosive gases.
- Accumulations of dust, grit, and dirt.
- Temperature and relative humidity extremes that are common to terminal operational sites for most industries.
- Most industrial types of electromagnetic interference associated with the terminal operational sites.
- Vibration and shock associated with shipping, placement, operation, and relocation of the terminal for most types of industries.

For environmental specifications refer to the *IBM 3630 Installation Manual - Physical Planning*, GA24-3675.

**On-Site Testing Allowance:** The 3647 Time and Attendance Terminal will be eligible designated units when the 3630, 4331 Loop Adaptor or 8100 controller to which they are attached qualifies for an on-site testing allowance.

**Systems Engineering Services:** Systems Engineering Services are available upon customer request and at a charge to assist the customer in the use of the 3647.

### Publications:

*IBM 3060 Plant Communication System - System Description*, GA24-3652  
*IBM 3647 Time and Attendance Terminal - Operating Guide*, GA24-3732  
*Introduction to 8100 Information System*, GA24-2875  
*Guide to the IBM 4331 Processor*, GC20-1878  
*IBM 4331/3640 Information Handbook*

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

(Canada only+)

- Voltage (120V AC, 1-phase, 60 Hz): **#9890** for locking plug, or **#9891** for non-locking plug.

**Note:** 120V AC is compatible with existing 115V AC systems. +)

(Except Canada+)

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V - <b>#2804</b>	100V - <b>#2730</b>
220V - <b>#2813</b>	120V - <b>#2802</b>
240V - <b>#2801</b>	

**Note 1:** 120V AC is compatible with existing 115V AC systems. 240V AC is compatible with existing 235V AC systems.

**Note 2:** A power cord and plug will be shipped from the plant of manufacture. The 3-digit WT country code in the DP machine order sheet will be used to select a power cord and plug of the specifications most commonly used in that country. A description of the plug and where-used list is provided in the *IBM 3630 Plant Communication System, Installation Manual- Physical Planning*, GA24-3675.

- **Power Plug:** [Japan Only] **#2714** for nonlocking or **#2715** for locking plug.
- **Power Cable:**
  - 1.8 meters (6 foot) cable - **#9986**
  - 4.3 meters (14 foot) cable - **#9987**
- **Communication Cable:** A communication cable (Loop Station Connector (LSC) cable) is provided for attachment to a direct attached or data link attached loop. Specify **#9976** for a 1.8 meter (6 foot) cable or **#9977** for a 4.3 meter (14 foot) cable.
- **Color:** Classic blue - **#9063** ... classic brown - **#9064** ... pebble gray - **#9065**.

**3647 Time and Attendance Terminal (cont'd)**

## • Nomenclature:

English US #2750	Portuguese (Brazil) #2933
Japanese #2930	Canadian English #2934
Spanish Speaking #2931	Canadian French #2935

**SPECIAL FEATURES**

**Control Feature (#1501):** Provides one point of TTL compatible input, one point of TTL compatible output, and two TTL compatible control signals. **Maximum:** One. **Field Installation:** No.

**Function Switch (#3950):** Provides a six-position rotary switch that can be set by the operator. Five switch settings each transmit a unique function code when a magnetic stripe is scanned. One switch setting is set to "null." The meaning of the switch position is left to the customer and space is provided for a customer printed definition label near the switch. **Maximum:** One. **Field Installation:** No.

**TERMS and CONDITIONS**

Plan Offering: D	Educational Allowance: No
Purchase Option: 55%	Pre-Installation Test Allowance:
Machine Group: A	None
Warranty: B	Pilot Test Plan: Yes
Initial Period of Maintenance Service: 3 months	
Per Call: 1	

**MODEL CONVERSION (None)**
**ACCESSORIES**
**MAGNETIC HAND SCANNER**

The Magnetic Hand Scanner (MHS) attaches by a 1.5m coiled cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. It allows the user to read magnetic stripe labels that are attached to shelves, cartons, machines, etc. It can also be used to read magnetic stripe tags which are hand-held or placed on a flat surface. See appropriate unit for prerequisites and possible limitations.

The MHS has three lights and an audible buzzer which provide feedback to the user on the status of the scanned data. With proper encoding the MHS can read a stripe in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the Magnetic Hand Scanner.

**Ordering Instructions:** See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Scanners will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare scanners which the customer may want to consider stocking:

Number of Scanners	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Scanner Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form #2110*, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
 Canadian Distribution Center  
 Dept. 415  
 75 Barber Green Road  
 Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. "Authorization Form #2110" applies.

**Magnetic Hand Scanner: P/N 4123495.**
**MAGNETIC SLOT READER  
 MAGNETIC SLOT READER, DUAL ENTRY**

The Magnetic Slot Reader (MSR) and Dual Entry Magnetic Slot Reader (DEMSR) attach by a 1.5m cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. These slot readers accommodate a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards, etc.

The MSR and DEMSR have three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. The DEMSR has wide openings on both ends to facilitate reading in either direction. A magnetic reader attachment feature on the appropriate machine is required to use the MSR or DEMSR.

**Ordering Instructions:** See IBM.

**Maintenance:** High densities of hard particulates may decrease scanner head life. In this environment, customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Number of Readers	Number of Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days.

In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a *Repair Center Machine Repair Authorization Form #2110*, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
 Canadian Distribution Center  
 Dept. 415  
 75 Barber Green Road  
 Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. "Authorization Form #2110" applies.

A Magnetic Reader attachment feature on the appropriate machine is required to use the Magnetic Slot Reader.

**Magnetic Slot Reader: P/N 4123500** or feature code #9441.

**Dual Entry Magnetic Slot Reader: P/N 4123520** or feature code #9442.

**MAGNETIC READER/SCANNER EXTENSION CABLES**

These cable assemblies can be used to extend the Magnetic Hand Scanner P/N 4123495 or Magnetic Slot Reader P/N 4123500 distances. Additional Extension Cable lengths other than those listed below are available.

MHS/MSR Extension Cables are warranted free from defects of workmanship or materials for 90 days.

**Limitation:** Extension cables cannot be plugged into other extension cables. @SS@

**Cable 6 meters (19.7 feet): P/N 4832986.**

**Cable 12 meters (39.4 feet): P/N 4832987.**

**3647 Time and Attendance Terminal (cont'd)**
**MAGNETIC READER/SCANNER REPLACEMENT ASSEMBLIES**

Description	P/N
MHS Sensor Head Assembly	4832721
MHS Handle and Feedback Assembly	4832701
MHS Amplifier Card and Cable Assembly	4832727
DEMSR/MSR Arm and Sensor Head Assembly	4832963
DEMSR/MSR Base and Feedback Assembly	4832973
DEMSR/MSR Amplifier Card and Cable Assembly	4832962
MSR Cover	4832964
DEMSR Cover	4123486

The following tables list the number of Magnetic Reader/Scanner replacement assemblies which the customer may want to consider stocking.

**Magnetic Hand Scanner**

Number of MHSs	Sensor Head Assemblies	Handle and Feedback Assembly	Amplifier Card and Cord Assembly
# 4123495	# 4832721	# 4832701	# 4832727
50	2	1	2
100	3	1	3
150	4	1	4
200	5	2	5

**Magnetic Slot Reader**

Number of MSRs	Arm and Sensor Head Assembly	Base and Feedback Assembly	Amplifier Card and Cord Assem	Cover
# 4123500	# 4832963	# 4832973	# 4832962	# 4832964
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Dual Entry Magnetic Slot Reader**

Number of DEMSRs	Arm and Sensor Head Assembly	Base and Feedback Assembly	Amplifier Card and Cord Assem	Cover
# 4123520	# 4832963	# 4832973	# 4832962	# 4123486
50	2	1	2	1
100	3	1	3	1
150	4	1	4	1
200	5	2	5	1

**Ordering Instructions:** See IBM.

**Warranty:** Magnetic scanner replacement assemblies are warranted free from defects of workmanship or materials for 90 days.

**WALL MOUNTING BRACKETS**

A two piece mounting bracket is available to mount the 3647 Time and Attendance Terminal to a wall, column, or other vertical surface.

One piece mounts on the 3647 and the other mounts on the vertical surface. There are four bracket holes on the back of the 3647 and four mounting screws supplied with the brackets. The customer is responsible for supplying the fasteners for the wall bracket.

**Ordering Instructions:** See IBM.

**Warranty:** Wall mounting brackets are warranted free from defects of workmanship and materials for 90 days.

**Wall Mounting Brackets:** P/N 4151768 or feature code #9450.

**MAGNETIC SLOT READER MOUNTING BRACKET**

The Mounting Bracket is used to firmly attach the MSR or DEMSR to the 3647. It locks to the front cover of the 3647 by a key lock. The magnetic reader cable is coiled under the bracket.

**Ordering Instructions:** See IBM

**Magnetic Slot Reader Mounting Bracket:** P/N 8632451.

**SUPPLIES**

None required with machine order. Supplies may be ordered through IBM for initial and replacement quantities. For further information consult your DP Supplies Coordinator.

## 3651 STORE CONTROLLER MODELS 25, 75

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The control unit for a 3650 Programmable Store System. Using standard retail functions tailored by the customer to his own requirements, and/or customer-supplied supermarket application programming, the 3651 controls the operation of the 3650 Programmable Store System and its related terminals and provides for communications with an appropriate S/370, 30XX, or 4300 virtual storage processor.

### MODELS 25, 75

**Model B25:** 9.2 megabyte integral disk storage. Limited features and processing capability. Supported by Programmable Store System Host Support only. Attaches 3275 model 3, 3653 model 1 and 1P, 3683 (all models), and 3663 model 1P, 2 and 3P terminals.

(Canada only) **Model C25:** Same as model B25 except has 18.4 megabyte integral disk storage. The model C25 is physically larger than the B25.<)

**Model A75:** 5 megabyte integral disk storage. Many features, full processing capability. Supported by Programmable Store System Host Support only. Attaches 3275 model 3, 3653 model 1 and 1P, 3683 all models, 3657 model 1, and 3663 model 1P, 2 and 3P terminals.

**Model B75:** Same as model A75 except has 9.3 megabyte integral disk storage.

**Model C75:** Same as model A75 except has 18.6 megabyte integral disk storage. The model C75 is physically larger than the model A75 and B75.

**Model D75:** Same as model A75 except has 27.9 megabyte integral disk storage. The model D75 is the same physical size as the model C75.

**Note:** The 3651 model B25 (Canada only) and C25 (<) Store Controller provide a lower entry system for those users who do not require the internal processing capability of the 3651 model A75, B75, C75 and D75. The effect of the different internal processing capability upon overall system performance is dependent upon the total system configuration and workload. To establish a supportable system configuration for any model Store Controller, systems design must be performed using the performance models and configuration aids available from IBM.

### HIGHLIGHTS

The 3651 is a modular, programmable unit that provides the link between its attached terminals and the host data processing center. The 3651 is normally used to collect data from the various parts of the system, perform edit, logic, and arithmetic operations on that data and then log and/or forward it to its ultimate destination within the overall system - terminal or data processing center. The 3651 mdl 75 can also communicate with another mdl 75. Application functions for retail operations via 3653 mdl 1 terminals or 3653 mdl 1P terminals, when functioning as 3653 mdl 1 terminals are provided as standard. All other applications are performed by customer-supplied application programming. In mdls B25, (Canada only) C25, (<) A75, B75, C75 and D75, customer-supplied supermarket and/or retail application programs may be used along with, or instead of, the standard retail operations. Standard features include the following:

- Loop Adapter

Mdl 25: Provides for attachment of one in-store local loop.

Mdl 75: Provides for attachment of one in-store local loop and one additional loop which may be specified as local or remote (see Figure 1).

### Controller Storage

The basic 3651 contains storage optionally expandable via special features (see "Special Features"). System configuration as well as user programs determine if additional storage increments are required.

### All Models

Basic Storage: 61,440 bytes  
Maximum Storage: 126,976 bytes

### Integral Disk Storage

The Integral Disk Storage is used for storage of selected controller functions, user-written application programs, system configuration data, data logging and data sets (files).

(Canada only)  
Models  
<)

	A75	B25/B75
Bytes per Track	15,360	15,360
Tracks per Cylinder	2	2
Bytes per Cylinder	30,720	30,720
Cylinders per IDS	167	301
Storage Capacity		
Movable Head	5,130,240	9,246,720
Fixed Head (M75)	122,880	122,880

(Canada only)  
Models  
<)

	C25/C75	D75
Bytes per Track	15,360	15,360
Tracks per Cylinder	2	2
Bytes per Cylinder	30,720	30,720
Cylinders per IDS	602	903
Storage Capacity		
Movable Head	8,493,440	27,740,160
Fixed Head (M75)	245,760	368,640

**Host Communications Adapter:** Mdl 75 (Canada only) and Mdl 25 with External Modem Interface (#9150) (<) Provides for transmission to and from a properly equipped S/370, 30XX, or 4300 processor. The basic transmission rate is 2400 bps over switched or non-switched networks with 4800 bps as a specify option. Also provides for communications with 8100 processors over nonswitched lines using SDLC. This adapter interfaces to appropriate IBM modems or to the local Attachment Interface of the 4331 processor or to the Direct Connection interface of 8100 processors. With the appropriate features available on mdl 75, only the Host Communications Adapter can communicate with another 3650 Programmable Store System or locally attach a 3704, 3705, 3720 or 3725. (Canada only) (Mdl 25 with 1200 bps Integrated Modem #9512 provides for transmission to and from a properly equipped S/370, 30XX, or 4300 processor. The basic transmission rate is 1200 bps over switched network using an IBM integrated modem.<) See "Communications Facilities" below and M2700 pages.

To communicate with another 3650 system or local attachment to a 3704, 3705, 3720 or 3725 see "Special Features" below.

**Audible Alarm:** Activated when predetermined events require operator attention or intervention for system operation. A contact closure to which the customer can attach his remote alarm is available as an option with 3669/3689 Attachment. (See "3669/3689 Attachment" in "Special Features" below)

**Controller Storage Save:** (Mdl 75 only) Critical areas of controller storage are automatically written on the integral disk unit when power is turned off or a power failure is detected.

**Terminal Device:** The terminals which are identified above under the different mdls of the 3651 are attached to the 3651 via Local/Remote Loop Adapter. Only the 3683 terminal, all mdls, will attach to 4800 bps Local Loop Adapter. Remote Loop Adapter available at 2400 bps only. A maximum of 191 terminals can be addressed by the 3651. However, the number of terminals which can be supported depends upon traffic volumes, desired response times, applications to be performed, and the mdl of the 3651.

One 3784 Line Printer mdl 1 may be attached to the 3651 Control Unit mdl 75.

**Communications Facilities:** The Host Communications Adapter (mdls 25 and 75), Auxiliary Communications Adapter (available on mdl 75 only) and 3669/3689 attachment (available on mdl 75 only) permit operation at the speeds indicated, over the facilities shown below, when using the appropriate DCE. For information concerning the facilities, see M2700 pages.

- At 1200 bps - on facility CA2 (switched - Canada only)
- At 1200 bps - on the public switched telephone network or a nonswitched voice grade line.
- At 2400 or 4800 bps - on the public switched telephone network, a nonswitched voice grade line, a public switched data network or a public nonswitched data network.

**Prerequisites:** At the host location, a virtual storage S/370, 30XX, or 4300 processor with properly equipped 3704, 3705, 3725 or communications adapter. See M2700, 3704, 3705, and 3725 pages.

## SPECIFY

- Power (AC, 1-phase):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
235V #2814	230V #9904

(Japan only) > For 100V 50/60 Hz, see RPQ 780210 for ordering instructions, prerequisites and limitations. <)

- Machine Nomenclature:

Canadian Eng #2934	Japanese #2930
Canadian Fr #2935	Spanish #2931
French #2928	UK English #2927
German #2929	US English #2750
Italian #2932	

- Line Facilities: Modem Attachment, Host Communications Adapter - one modem can be attached to this adapter on the 3651. The 3651 provides a cable and interface for connection of modems at transmission rates of 1200, 2400 and 4800 bps for communication with the S/370, 30XX, or 4300 processor. If switched network is selected, auto answer capability is standard. If a non-mandatory modem is used, specify code #9770 Wrap Cable is available to facilitate problem determination. The modem must provide the clocking, a CCITT V.24/V.28 or RS-232-C Type D or E interface and must operate at speeds of 4800 bps or less on the Host Communications Adapter and the Auxiliary Communications Adapter.

Service (bps)	Specify Code
1200	#2821
2400	#2826
4800	#2827

- (Canada only) > Modem Attachment Host Communications Adapter: One IBM modem can be attached to this adapter on

the 3651. The 3651 (except mdl 25) provides a cable and interface for connection of IBM modems at transmission rates of 2400 or 4800 bps for communications with the S/370, 30XX, 4300 processor or 8100 System. Can also be attached without modem to the local Attachment Interface (#4801) of a 4331 processor, mdl group 1 or 2. Can also be attached without modem at 4800 bps to the Direct Connection interface (SDLC FAC 16) of an 8101, 8130, or 8140 processor. The 3651 mdl 25 is featured to provide either a switched 1200 bps integrated modem (#9512) or an external modem interface (#9150) for connection of IBM modems at transmission rates of 2400 or 4800 bps for communications with the S/370, 30XX, 4300 processor or 8100 System. If switched network is selected, auto answer capability is standard. If leased operation is selected, dial backup is provided on a manual dial basis using the 3863, 3864, 3872 or 3874 Modem with appropriate special features. 4-wire Switched Network Backup is available with the 3863 mdl 1 and 3864 mdl 1.

- External Modem Interface (#9150): (Mdl 25) Provides a cable and interface on the Host Communications Adapter for connection of an IBM modem at transmission rates of 2400 or 4800 bps for communications over switched or leased networks. If switched network is selected auto answer capability is standard. Limitations: Not available with 1200 bps Integrated Modem (#9512). Maximum: One. Field Installation: Yes. Prerequisites: A 3863, 3864, 3872 or 3874 modem.
- If a non-IBM modem is used, Specify Code #9770 Wrap Cable is available to facilitate problem determination. The non-IBM modem must provide the clocking, an RS-232-C Type D or E interface and must operate at speeds of 4800 bps or less on the Host Communications Adapter and the Auxiliary Communications Adapter.

Service (bps)	Specify Code
---------------	--------------

2400	#9120
4800	#9126

## Notes:

- For communications capabilities product description and special features, see M2700, 3863, 3864, and 3872 pages.
  - Specify codes #9120 and #9126 are not applicable with 1200 bps Integrated Modem (#9512).
- 1200 bps Integrated Modem (#9512): (Mdl 25) Provides an integrated modem for operation over switched communication facilities at 1200 bps. Auto answer is provided. The cable provided is compatible with the IBM Protective Coupler (CBS type) available as P/N 1649100 (see RPQ 8Q0130 for description). For Canada, an additional cable is provided for attachment to the Canadian protective coupler. Limitations: Not available with External Modem Interface (#9150). Field Installation: Yes. Maximum: One. Prerequisites: An FCC-registered protective device (DAA) of the CBS type is to be provided by the user. <)
  - Modem Attachments:
    - For Host Communications Adapter (specify one):
      - 3976 mdl 3. PTT-mandatory modems at 1200 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2982. Prerequisite: #2858.
      - 3863 or 3872. PTT-mandatory modems at 2400 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.26 or V.26bis, and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2891, #2897.

- (Canada only) Facility K3M (mdl 25 only). Specify: #2897. Prerequisite: #9150.
  - Facility K3M (mdl 75 only). Specify: #2897. <)
  - 3864. PTT-mandatory modems at 4800 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.27 or V.27bis or V.27ter, and ISO Standard 2110, or PTT-mandatory modems at speeds up to 4800 bps on nonswitched limited distance (base-band) lines complying with CCITT Recommendations (1976) V.24, V.28 and ISO Standard 2110. Refer to M2700 pages. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2954.
  - TCTS Dataroute Network in Canada at 2400 or 4800 bps (mdl 25). Specify: #2846. Prerequisites: #9150.
  - CN/CPT Infodat Network in Canada at 2400 or 4800 bps (mdl 25). Specify: #2846. Prerequisites: #9150.
  - TCTS Dataroute Network in Canada at 2400 or 4800 bps (mdl 75). Specify: #2846.
  - CN/CPT Infodat Network in Canada at 2400 or 4800 bps (mdl 75). Specify: #2846.
  - NTT DDC Network in Japan at 2400 or 4800 bps. Specify: #2846.
  - NTT DDX Network in Japan at 2400 or 4800 bps.
  - 3704/3705/3725 Direct Attach at 2400 bps (3651 mdl 75 only). Specify: #2863.
  - In Japan to satisfy the NTT's DTE Self Test requirements when attaching a non-IBM modem. Specify: #2946.
  - Transdata Network in Brazil at 2400/4800 bps non-switched service.
  - 3669 mdl 1 or 3689 mdl 1 for 3650 backup or host Communication on Canadian Public Switched Telephone Network. Specify: #9200. Prerequisites: #8069.
- Note: Maximum one 3669 per 3651. Aux. Comm. Adapter (#6185, #2703, #2704) not allowed.
2. For Aux. Comm. Adapter Feature (#6185, #2703, #2704): These features not allowed if feature #8069 and specify #9200 (3669 Attachment on Host Comm. Adapter) are present. Only one of the Aux. Comm. Adapters (#6185, #2703 or #2704) allowed per 3651 mdl 75.
- For 3650 Backup:
    - ▲ 3669 mdl 3. Specify: #9210.
    - ▲ 3669 mdl 1 or 3689 mdl 1 for 3650 backup on Canadian Public Switched Telephone Network.
  - For 3651 to 3651 Operation:
    - ▲ 3976 mdl 3. PTT-mandatory modems at 1200 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2721. Prerequisites: #2703.
    - ▲ 3863, 3864, 3872, or 3874. Specify: #2727. Prerequisites: #6185.
- ▲ TCTS Data Route Network in Canada (2400 bps). Specify: #2726. Prerequisites: #6185.
  - ▲ PTT-mandatory modems at 2400 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.26 or V.26bis and ISO Standard 2110, or PTT-mandatory modems at 2400 bps on nonswitched limited distance (base-band) lines complying with CCITT Recommendations (1976) V.24, V.28 and ISO 2110. Refer to M2700 pages. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.
  - ▲ In Japan, to satisfy the NTT's DTE self-test requirements when attaching a non-IBM modem. Specify: #2946. Prerequisites: #6185.
  - ▲ Transdata Network in Brazil at 2400/4800 bps nonswitched service.
  - ▲ Facility K3M in Canada. Specify: #2725. Prerequisites: #6185.
- For Remote Loop Communications: Specify one for each Remote Loop Adapter (#9552 or #6111).
- ▲ 3872 mdl 1 for Multipoint Remote Loops. Specify: #2892.
  - ▲ 3872 mdl 1 with #6101 for Serial Remote Loops. Specify: #2892.
  - ▲ PTT-mandatory modems at 2400 bps on non-switched lines complying with CCITT Recommendations (1976) V.24, V.26, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2867.
- Controller Designation: Specify #9491 on the first 3651 mdl 25 or 75 to be used with a host system location requiring 3650 Programmable Store System Host Support. Specify #9492 on each additional 3651 mdl 25 or 75 in the network. Specification of #9491 will provide IBM control code for the controller and all its attached devices (except the 3683 terminal) via a DTR sent to the designated host location.
- In addition, if #9491 is specified, also specify #9493 if any 3683 terminals are attached to the 3651 controller and if a 3680 system is not attached to the same host system as the 3651. Specification of #9493 will provide 3683 control code. (If a 3680 system is attached to the same host system, the 3683 control code is provided by a specify code on the 3684.) When #9491 is specified, additional information must be specified as follows:
1. Specify one of the following to indicate magnetic tape density (media) used at the host system location. The tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.
    - #9412: 9-track 800 bpi
    - #9413: 9-track 1600 bpi
    - #9414: 9-track 6250 bpi
- The 3651 controller data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.
2. Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:
    - Line 1 - IBM Programming Systems Rep.
    - Line 2 - c/o (Name of Customer)
    - Line 3 - Street Address (or P.O. Box)
    - Line 4 - City, Country, Postal Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code #9491). Whenever controller data is updated by an EC, the EC will be shipped to the most current Microcode Control (MC) address.

In addition, if #9493 is specified with #9491, specify #9490 if there is a storage requirement that prevents 3683 operation with the current level of 3683 control code (i.e., EC 320560 or later). #9490 provides 3683 control code level EC 320503 which operates in the same control code storage allocation as is required for 3683 control code level EC 320502. It is strongly recommended that new 3683 customers and 3687 customers do not take this specify option.

- Specify the following: #9504 - for 3650 BSC or SDLC Programmable Store Systems host support under DOS/VS VTAM or BTAM, OS/VS1 VTAM or BTAM, and OS/VS2 VTAM or BTAM.

**Note:** The corresponding release of 3650 PSS Host Support must be ordered from IBM. See SCP pages.

- Store Loop Polarity Tester: One is furnished at each site at no charge. See "Accessories" for additional Store Loop Polarity Testers.

**Notes:**

- Tester matches receptacle ("Female Loop Connector"), P/N 5162880. See "Accessories".
  - The customer must provide (purchase, install and maintain) all necessary 3650 communication lines within the store. (Bulk Loop cable is available from IBM; see "Accessories".)
  - Second Loop Adapter (mdl 75 only): Specify #9442 to designate the second loop adapter as local or specify #9552 to designate the second loop adapter as remote. Do not use these specify features if ordering 4800 bps local loop adapter for loop positions 1 and 2 (#4895). See Figure 1 below.
- Note:** Specify #9552 not allowed with 3669/3689 Attachment (#8069).
- RFI Standard: The RFI Standard (Specify #2759) is now provided on all machines as standard.

## SPECIAL FEATURES

**Control Storage Features:** The amount to be ordered is dependent upon the number and type of terminals attached to the system as well as system configuration and user programs. For available storage configurations, see Table A below.

**Storage Increment - Type II (#1564):** Each #1564 provides the 3651 with an additional 16,384 positions of storage. Maximum: Three (see Table A). Field Installation: Yes. Prerequisites: The 3651 must be equipped with Storage Expansion Feature (#1570) and First Storage Increment (#1571).

Table A

Storage Configuration		Feature Distribution		
Total Storage	Storage Expansion (#1570)	First Storage Increment (#1571)	Storage Increment Type II (#1564)	
(A) 61440	0	0	0	
(B) 77824	1	1	0	
(C) 94208	1	1	1	
(D) 110592	1	1	2	
(E) 126976	1	1	3	

**Storage Expansion Feature (#1570):** Provides the capability of expanding storage beyond 61,440 bytes. Maximum: One. Field Installation: Yes. Note: First Storage Increment (#1571) or First Storage Increment (#1571) and Storage Increment - Type II (#1564) are required to provide the appropriate additional positions of storage (see Table A).

**First Storage Increment (#1571):** Provides the 3651 with the first 16,384 additional positions of storage. See Table A. Maximum: One. Field Installation: Yes. Prerequisites: #1570.

**Aux Comm Adapter Synchronous Clock and CCITT Interface (#2703):** (Mdl's A75, B75, C75, D75) Provides a separate 600/1200 bps communications interface which can operate independently of the Host Communications Adapter and communicate via a 3976 mdl 3 or mandatory PTT (or equivalent) modems to another 3651 mdl 75 with the same feature. Limitations: Only one Auxiliary Communications Adapter (#2703, #2704, #6185) allowed per 3651 mdl 75, not allowed with 3669/3689 Attachment #8069. Maximum: One. Field Installation: Yes. Prerequisites: A 3976 mdl 3 or a mandatory 600/1200 bps PTT modem (and in some countries RPQ 7B0212) and appropriate specify code plus another 3651 mdl 75 similarly equipped.

**Auxiliary Communications Adapter Direct Attach (#2704):** (Mdl's A75, B75, C75, D75) Provides a 2400 bps communications interface which operates independently from the Host Communications Adapter to allow direct communications with another 3651 mdl 75 with the same feature without the use of modems. Limitations: Only one Auxiliary Communications Adapter (#2703 or #2704 or #6185) allowed per 3651 mdl 75, not allowed with 3669/3689 attachment (#8069). Maximum: One. Field Installation: Yes. Prerequisites: Another 3651 mdl 75 with (#2704).

**Synchronous Clock and CCITT Interface (#2858):** (Canada only > (Not C25) <) This feature provides interface for the host communication adapter for attachment of the 3976 Modem mdl 3 or a supported PTT-mandatory modem at 1200/600 bps. See the M2700 pages, facility C2 or D5, for details. Operation at 600 or 1200 bps is selectable. Limitations: Not allowed with 3669/3689 Attachment (#8069) with specify #9200. Maximum: One. In Japan, #2946 must be specified to satisfy the NTT's DTE Self-Test requirements when attaching a non-IBM modem. Note: Required with specify code #2982.

**Direct Attachment 3704/3705 (#2863):** (Mdl's A75, B75, C75, D75) Provides clocking from the Host Communications Adapter allowing the direct attachment to a local 3704 or 3705 at 2400 bps. Limitations: Not allowed with 3669/3689 attachment (#8069) with specify #9200. Maximum: One. Field Installation: Yes. Prerequisites: The 3704 or 3705 must be equipped with Line Set, Type 1F (#4716). Note: A 6m (20 ft) external cable is provided which connects to the 3704/3705 cable.

**IML-Write Adapter (#4633):** Provides the 3651 with the ability to write an IML (Initial Machine Load) tape on a user provided tape cassette recorder to be read by a Point-of-Sale terminal equipped with the appropriate IML-Read Adapter (#4632 or #4633) feature. (Refer to "IBM 3650 Programmable Store System Introduction Manual", GA27-3163, for cassette recorder interface requirement.) Maximum: One. Field Installation: Yes.

**Local Loop Adapter, Add'l (#4882):** (Mdl's A75, B75, C75, D75) Provides an additional Local Loop Adapter as the Third Loop on the 3651. The actual number of terminals that can be attached will depend upon the program capacity and time requirements of the 3651 to service the loops as well as the communications link to the S/370. See "Terminal Devices" above. Specify: See Figure 1. Limitations: Not available on the 3651 if 9600 bps Loop Adapter (#4890), 4800 bps Loop Adapter (#4900) or Remote Loop Adapter (#6111) is installed. Maximum: One. Field Installation: Yes.

**9600 bps Loop Adapter (#4890):** (Mdl's A75, B75, C75, D75) Provides a 9600 bps local Loop Adapter as the Third Loop. The feature provides for the attachment of 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) feature installed. The actual number of 3275 Display Station mdl 3s installed will depend upon program capacity and time requirements of the 3651 to service the Loops and

the communications link to the S/370. See "Terminal Devices" above. Limitations: Not available if Local Loop Adapter, Add'l (#4882), 4800 bps Loop Adapter (#4900) or Remote Loop Adapter (#6111) is installed. Only 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) can be attached to this Loop adapter. Specify: See Figure 1. Maximum: One. Field Installation: Yes.

**4800 bps Loop Adapters (#4895):** (Mdl's A75, B75, C75, D75) Provides 4800 bps Loop Adapters in Loop Adapter positions 1 and 2. The actual number of 3683 terminals that can be attached will depend upon the program capacity and time requirements of the 3651 to service the loops as well as the communication link to the S/370. See "Terminal Devices" above. Limitations: Not allowed with additional 2400 bps Local Loop Adapter (#9442) or 2400 bps Remote Loop Adapter (#9552). Specify: See Figure 1. Maximum: One. Field Installation: Yes.

**4800 bps Loop Adapter (#4900):** (Mdl's A75, B75, C75, D75) Provides a 4800 bps local loop adapter as the third loop adapter on the 3651. The actual number of 3683 terminals that can be attached will depend upon the program capacity and time requirements of the 3651 to service the loops as well as the communications link to the S/370. See "Terminal Devices" above. Specify: See Figure 1. Limitations: Not available on the 3651 if 2400 bps Local Loop Adapter (#4882) or 9600 bps Local Loop Adapter (#4890) or 2400 bps Remote Loop Adapter (#6111) is installed. Maximum: One. Field Installation: Yes.

**Remote Loop Adapter (#6111):** (Mdl's A75, B75, C75, D75) Provides a Remote Loop Adapter as the third loop on the 3651 for online service for up to 12 remote sites per Remote Loop Adapter. The feature provides an interface to a 3872 Modem on site which via leased line connects to a 3659 Remote Communications Unit at each remote site. This allows for the extension of the Loop to up to (1) three remote locations, with a 3659 mdl 1 at each site, (2) 12 remote locations, with a 3659 mdl 2 (multipoint) at each site, (see "Terminal Devices" above). The 3651 treats the remote Loop as if it were a local Loop. Specify: See Figure 1. Limitations: Not available if Local Loop Adapter, Add'l (#4882), 9600 bps Loop Adapter (#4890) or 4800 bps Loop Adapter (#4900) is installed. Maximum: One. Field Installation: Yes. Prerequisites: One 3872 with #6101 or #6102 per Remote Loop Adapter at 3651 site and a 3659 Remote Communications Unit at each remote site. When more than one remote site is attached using 3659 mdl 1, a half-duplex 2-wire terminated, non-switched voice grade line is required between the 3651 and the first remote site between successive remote sites, and from the last remote site back to the 4-wire terminated nonswitched voice grade line is required. When using the 3659 mdl 2 for more than one remote site, 4-wire duplex multipoint service is required. The 3659 mdl 2 requires that the 3872 be a basic control station (no special features) or equipped with #6302. Note: The 3872 or equivalent PTT listed modem may be used.

**Auxiliary Communications Adapter (#6185):** (Mdl's A75, B75, C75, D75) Provides a separate 2400 bps or 4800 bps communications interface which can operate independently of the Host Communications Adapter. It can be used for either one of the following but not both: (1) 3651 mdl 75 to mdl 75 communications, or (2) Communications with another 3650 system via a 3669 Store Communications Unit at 2400 bps(Canada only) or a 3689 Store Communications Unit at 4800 bps(<). Limitations: Only one Auxiliary Communications Adapter (#2703 or #2704 or #6185) allowed per 3651 mdl 75, not allowed with 3669/3689 Attachment (#8069) with specify #9200 for Host Communications Adapter. The 4800 bps Auxiliary Communications Adapter cannot operate concurrently with 4800 bps Host Communications Adapter and the three 4800 bps Loop Adapters (#4895 and #4900). Only four of the five may operate concurrently at greater than 2400 bps. Maximum: One. Field Installation: Yes. Prerequisites: (1) For 3651 mdl 75 to mdl 75 communications: A 3863, 3864, 3872, or 3874, or a mandatory PTT 2400 bps or 4800 bps modem (and, in some countries, RPQ 7B0212) and appropriate specify code, plus another 3651 mdl 75 similarly equipped. (2) For backup with another 3650 system: #8069 with #9210, or a 3669 Store Communications Unit at 2400 bps(Canada only) or a 3689 Store Communications Unit at 4800 bps(<).

**3669/3689 Attachment (#8069):** (Mdl's A75, B75, C75, D75) Provides the capability to attach one 3669 Store Communications Unit, which

allows communications over switched networks at 2400 bps(Canada only) or one 3689 Store Communications Unit, which allows communications over switched networks at 4800 bps(<) with another 3650 system, and alternately with a S/370 host processor. This feature can be provided for use with either the Host Communications Adapter or the Auxiliary Communications Adapter (#6185), but not with both. If the Auxiliary Communications Adapter is present, however, then this feature must be installed for use with the Auxiliary Communications Adapter. Limitations: When used with Auxiliary Communications Adapter, (#6185), it cannot communicate with a host processor. #9210 not allowed with Auxiliary Communications Adapter Synchronous Clock and CCITT Interface (#2703) or Auxiliary Communications Adapter Direct Attachment (#2704). #9200 not allowed with Direct Attachment 3704/3705 (#2863) or Synchronous Clock and CCITT Interface (#2858). Specify: (1) #9200, for use with Host Communications Adapter, #9210 for use with Auxiliary Communications Adapter #6185. (2) #9220 if local audible alarm is desired, #9230 if contact closure is desired when operator attention is required. Maximum: One. Field Installation: Yes. Prerequisites: (1) Local Loop Adapter, specify #9442 for 2400 bps; or 4800 bps Local Loop Adapter, specify #4895. (2) 3669 (Canada only) or 3689(<) Store Communications Unit. (3) Auxiliary Communications Adapter (#6185) if #9210 is specified. (Except Canada>Note: FC8069 (3669/3689 Attachment) is compatible with the 3669 mdl 3 with RPQ ZB7983 4800 bps operation.<)

**3784 Adapter (#8154):** (Mdl's A75, B75, C75, D75) Provides the capability to directly attach one 3784 Line Printer mdl 1 to the 3651 controller. Fixed length cables are supplied as standard. Refer to "3650 PSS Installation Manual -- Physical Planning", GA27-3167. Maximum: One. Field Installation: Yes. Prerequisites: Specify #9716 on the 3784 mdl 1 for attachment of the 3784 to the 3651 mdl A75 and B75 and #9717 for attachment to the 3651 mdl C75 or D75.

Figure 1

Loop Adapter Position	Loop *Adapter	Special Feature	Specify Code
1	Local	2400 bps	Standard
1 & 2	Local	4800 bps	#4895
2	Add'l		
	Local	2400 bps	#9442
	Remote	2400 bps	#9552
3	Add'l		
	Local	2400 bps	#4882
	Add'l		
	Local	4800 bps	#4900
		9600 bps	#4890
	Remote	2400 bps	#6111

Unless the 4800 bps Local Loop Adapter feature (#4895) is ordered for positions 1 and 2, Loop Adapter Position 1 is occupied by the standard Local Loop Adapter (2400 bps) and Loop Adapter Position 2 is also standard and must be specified as 2400 bps local (#9442) or 2400 bps remote (#9552). If loop adapter position 2 is specified as remote, see Remote Loop Adapter (#6111) for prerequisites which will apply. For Loop Adapter Position 3, either a 2400 bps Add'l Local (#4882) or a 4800 bps Add'l Local (#4900) or 2400 bps Remote (#6111) or 9600 bps Local (#4890) Loop Adapter may be ordered. Limitations: Host communications, Auxiliary Communications, and Loop Adapters 1-3 cannot operate at 4800 bps or greater simultaneously. One adapter must be 2400 bps or less to allow all communications to operate simultaneously.

### MODEL CONVERSIONS

The following model changes can be made in the field:

From	To	A75	B75	C75	D75
A50	X		X*		
A60	X		X*		

A75	X*
B25	X*
B50	X
B60	X
(Canada only>	
C25	X*      X*<)
C75	X      X

\* These model changes require the replacement of the integral disk storage. Adequate provision must be made for retaining data contained on the replaced disk storage at the host location so it can be transmitted to the new disk storage.

(Canada only> On purchased model 25 to model 75 changes, External Modem Interface (#9150) is a prerequisite on the model 25. <)

On purchased model 50 to model 75 changes, either Local Loop Adapter, Add'l (#4882 with #9442 or #9443) or Remote Loop Adapter (#6111 with #9552 or #9553) is a prerequisite on the mdl 50.

## ACCESSORIES

**Cables:** IBM shielded twisted-pair cable (or equivalent) or bulk indoor loop cable is required for attachment of 3650 units. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

- Twisted-pair cable - For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation within your country.

**Bulk Indoor Loop Cable (P/N 5165886):** Bulk Indoor Loop Cable to attach 3650 units may be purchased from IBM or a customer-selected source. See "Physical Planning Manual", GA27-3074, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM.

**Cables P/N 7838695:** This Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b.) Maximum allowable cable temperature range is -34 degrees C to +105 degrees C. This Bulk Indoor Loop Cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). Warranty: Loop Cable is warranted free from defects of workmanship and materials for 90 days.

## Loop Accessories

**Female Loop Connector (P/N 5162880):** The Female Loop Connectors will be used in all positions of the 3650 Store Loops where terminals will potentially be installed. The corresponding male connector will either be the plug provided on each terminal or, in the case of the loop position currently not occupied by a terminal, the Loop Shorting Plug (see below).

**Loop Shorting Plug (P/N 1860198):** The Loop Shorting Plug will be used in all 3650 Store Loop positions that are not occupied by terminals. See "3650 Physical Planning Manual", GA27-3074, for details.

**Store Loop Polarity Tester:** Order via MES or PSR from Vimercate.

## SUPPLIES

Contact IBM.

## 3651 STORE CONTROLLER MDLS A50, B50

(NO LONGER AVAILABLE)

### PURPOSE

Through its standard functions, tailored by the customer to his own requirements, the 3651 controls the operation of the 3650 Retail Store System and its related terminals and provides for communication with an appropriate S/370, 30XX, or 4300 virtual storage processor.

### MODELS A50, B50

**Model A50:** 5 megabytes of integral disk storage

**Model B50:** 9.3 megabytes of integral disk storage

### HIGHLIGHTS

The 3651 is a modular, programmable unit that provides the link between point-of-sale (3653), receiving-marking (3275 mdl 3 and 3657), management (via 3275 mdl 3), and the host data processing center. The 3651 collects data from the various parts of the retail system, performs edit, logic, and arithmetic operations on that data and then logs and/or forwards it to its ultimate destination within the overall system-terminal or data processing center. The 3651 also communicates with its attached terminals on an interactive basis and processes inquiries against its files. Standard features include the following:

- **Local Loop Adapter:** Provides for the attachment of one in-store loop.
- **Controller Storage:** The basic 3651 contains storage optionally expandable via special features to 106,496 bytes (see "Special Features"). System configuration as well as user programs determine if additional storage increments are required. Operation with many user programs will require the additional storage increments.
- **Integral Disk Storage:** The Integral Disk Storage is used for storage of selected controller functions, user written application programs, system configuration data, data logging and data sets (files).

	Model A50 (5MB)	Model B50 (9.3MB)
Bytes per Track	15,360	15,360
Tracks per Cylinder	2	2
Bytes per Cylinder	30,720	30,720
Cylinders per IDS	167	301
Storage Capacity		
Movable Head	5,130,240	9,246,720
Fixed Head	122,880	122,880

**Host Communications Adapter:** Provides for transmission to and from a properly equipped S/370, 30XX, or 4300 Processor. The basic transmission rate is 2400 bps over nonswitched or switched networks with 4800 bps as a specify option. This adapter interfaces to appropriate IBM modems (see "Communication Facilities" below and M2700 pages). For local attachment to 3704/3705 or communications adapter on a 4321/4331 processor, see "Special Features".

**Audible Alarm:** Is activated when predetermined events require operator attention or intervention for system operation.

**Controller Storage Save:** Critical areas of controller storage are automatically written on two areas of the integral disk unit when power is turned off or a power failure is detected.

**Terminal Devices:** The following terminals are attached to the 3651 Store Controller via Local/Remote Loop Adapter: 3653 Point of Sale Terminal, 3275 mdl 3 Display Station, and the 3657 Ticket Unit. Local Loop adapter number one can address 63 terminals and the other two Loop adapters (local or remote) can each address 64 terminals. However, the number of terminals which can be supported on each Loop depends upon traffic volumes, desired response times, and applications to be performed.

One 3784 Line Printer mdl 1 may be attached to the 3651 controller unit.

To establish a supportable systems configuration, systems design should be performed using the performance models and configuration aids available from IBM.

**Communication Facilities:** The communications adapter permits operation at the speeds indicated, over the facilities shown below, when using the appropriate modem. For information concerning the facilities, see M2700 pages. The alphanumeric communication facility references below correspond to those shown on the charts on those pages.

- At 1200 bps: PSTN or NSVGL
- At 2400 bps: PSTN, NSVGL, PSDN or PNSDN
- At 4800 bps: NSVGL, PSDN or PNSDN

PSTN = the public switched telephone network

NSVGL = a nonswitched voice grade line

PSDN = a public switched data network

PNSDN = a public nonswitched data network

**Prerequisites:** A 3704 or 3705 in 2701, 2703 Emulation Mode for BSC systems and in NCP/VS mode for SDLC systems (with appropriate features; see M3704 and 3705 pages) attached to any virtual storage S/370 or 4300 processor (except 3115). Also attaches via a Communications Adapter feature on the 4321 or 4331 processor. See M4321 or 4331 pages for details. Communications at 1200 bps require Synchronous Clock and CCITT Interface (#2858).

### Publications:

- GA27-3075 IBM 3650 Retail Store System Introduction

### SPECIFY

- **Power (AC, 1-phase):**

	50 Hz	60 Hz
200V #2806		200V #2732
220V #2813		208V #9902
235V #2814		230V #9904

(Japan only > For 100V 50/60 Hz, see RPQ 780210 for ordering instructions, prerequisites and limitations. <)

- **Machine Nomenclature:**

Canadian Eng #2934	Japanese #2930
Canadian Fr #2935	Spanish #2931
French #2928	UK English #2927
German #2929	US English #2750
Italian #2932	

- **Modem Attachment Host Communications Adapter:** One IBM modem can be attached to this adapter on the 3651. The 3651 provides a cable and interface for connections of IBM modems at transmission rates of 1200, 2400 or 4800 bps for communications with the S/370, 30XX, or 4300 processor. Attachment can also be without modem to the local Attachment Interface (#4801) of a 4331 processor. If switched network is selected, auto answer capability is standard. If a non-IBM modem is

used, Specify Code #9770 Wrap Cable is available to facilitate problem determination. The non-IBM modem must provide the clocking, an RS-232-C Type D or E interface and must operate at speeds of 4800 bps or less.

Specify  
Code

Speed (bps) Facility (1)

#2821	1200	PSTN
#2822	2400	PSTN
#2823	1200 (2)	NSVGL
#2824	1200 (3)	NSVGL
#2825	2400 (2)	NSVGL or PNSDN
#2826	2400 (3)	NSVGL or PNSDN
#2827	4800 (2)	NSVGL or PNSDN
#2828	4800 (3)	NSVGL or PNSDN

PSTN = the public switched telephone network  
NSVGL = a nonswitched voice grade line  
PNSDN = a public nonswitched data network

Notes:

1. For communications capabilities, product description and special features, see M2700, 3863, 3864, and 3872 pages.
2. Point-to-point network.
3. Multipoint network.

If a non-mandatory modem is used, Specify Code #9770 Wrap Cable is available to facilitate problem determination. The modem must provide the clocking, a CCITT V.24/V.28 or RS-232-C Type D or E interface and must operate at speeds of 4800 bps or less.

● Modem Attachments:

1. For Host Communications Adapter (specify one):

- PTT-mandatory modems at 1200 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.
- 3872 Modem. Specify: #2891.
- Facility K3M in Canada. Specify: #2897.
- PTT-mandatory modems at 2400 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.26 or V.26bis, and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2897.
- PTT-mandatory modems at 4800 bps on switched or nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.27 or V.27bis or V.27ter, and ISO Standard 2110, or PTT-mandatory modems at speeds up to 4800 bps on nonswitched limited distance (base-band) lines complying with CCITT Recommendations (1976) V.24, V.28 and ISO Standard 2110. Refer to M2700 pages. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Specify: #2846.
- TCTS Dataroute Network, Canada at 2400 or 4800 bps.
- CN/CPT Infodat Network, Canada at 2400 or 4800 bps.
- NTT DDC Network, Japan at 2400 or 4800 bps.
- NTT DDX Network, Japan, at 2400 or 4800 bps.
- 3704/3705 direct attach at 2400 bps. Specify: #2863.

- In Japan, to satisfy the NTT's DTE self test requirements when attaching a non-IBM modem. Specify: #2946.

- Transdata Network in Brazil at 2400/4800 bps non-switched service.

2. Remote Loop Communications (specify one for each Remote Loop Adapter, #6111):

- 3872 mdl 1 with Point-to-point (#6101). Specify: #2892.
- PTT-mandatory modems at 2400 bps on non-switched lines complying with CCITT Recommendations (1976) V.24, V.26, V.28 ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

- Controller Designation: Specify #9491 on first 3651 to be used with a host system location requiring RSS/Host support and #9492 on each additional 3651 in the network.

When #9491 is specified, additional information must be specified as follows:

1. Specify one of the following to indicate magnetic tape density (media) used at the host system location. The tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.
  - #9412 -- 9-track 800 bpi
  - #9413 -- 9-track 1600 bpi
  - #9414 -- 9-track 6250 bpi

The 3651 controller data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

2. Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

- Line 1 -- IBM Programming Systems Rep
- Line 2 -- c/o (Name of Customer)
- Line 3 -- Street Address (or P.O. Box)
- Line 4 (etc.) -- City, Country, Postal Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code #9491). Whenever controller data is updated by an EC, the EC will be shipped to the most current TPC address.

- Specify #9503 for 3650 SNA Retail Store Systems requiring Release 3 RSS/Host Support under DOS/VS VTAM, OS/VS1 VTAM and OS/VS2 VTAM. All controllers shipped to new customers after June, 1976 require RSS/Host Release 3 and should be specified with #9503. Notes: (1) #9503 is a prerequisite for #1559, #1560 and #1564. (2) The corresponding release of 3650 RSS Host Support must be ordered. See SCP pages.

- System Changes: Specify one of the following:

- Changes to On-Order Network: If more than one 3651 is on order and the one with #9491 specified is deferred (or cancelled), the 3651 with #9492 specified and the earliest schedule date must be selected as the new 'first' 3651.

On the newly-selected 'first' 3651, delete #9492 and add #9491. In addition, specify all items required above when #9491 is ordered (item previously specified on the deferred or cancelled machine). On the deferred 3651, delete #9491 and add #9492, then delete all items associated with #9491 which are being added to the new 'first' 3651. It is also required to specify the 3650 Retail Store System Support Release which will be used.

- Changes to Installed Network -- MESS:

Important: Close coordination with host system location is required since changes to the entire network must be made concurrently.

If an installed 3651 with (#9491 and either #9501 or #9502 specified) is discontinued for any reason, an installed 3651 (with #9492 specified) must be selected as the first 3651 in the network. On the newly selected 'first' 3651, an MES is required to effect the following changes:

1. Delete #9492 and add #9491.
2. For #9491: Add #9501 or #9502.

- Changes at Host System Location Affecting 3651: If host system location changes the density of tape drives (e.g., from 800 bpi to 1600 bpi), the media Specify code must be changed on the on-order or installed 3651 with #9491 specified. The former media code must be deleted and a new one added.

- Store Loop Polarity Tester: One is furnished at each site at no charge. See "Accessories" for additional Store Loop Polarity Testers.

Notes:

- Tester matches receptacle ("Female Loop Connector"), P/N 5162880. See "Accessories".
- The customer must provide (purchase, install and maintain) all necessary 3650 communication lines within the store. (Bulk Loop cable is available from IBM; see "Accessories".)

- RFI Standard: The RFI Standard (#2759) is now provided on all machines as standard.

## SPECIAL FEATURES

**Control Storage Features:** The amount to be ordered is dependent upon the number and type of terminals attached to the system as well as system configuration and user programs. For available storage configurations, see Table A below.

**Storage Increment - Type I (#1559):** #1559 provides the 3651 with an additional 8,192 positions of storage. Maximum: One. Field Installation: Yes. (See Table A.) Prerequisites: #9503.

**Storage Expansion (#1560):** Contains 16,384 positions of storage to provide the capability of expanding storage beyond 57,344 positions to a maximum of 106,496 positions. Maximum: One. Field Installation: Yes. (See Table A.) Prerequisites: #9503.

**Storage Increment - Type II (#1564):** Each #1564 provides the 3651 with an additional 16,384 positions of storage. Maximum: Three. Field Installation: Yes. Prerequisites: #9503. (See Table A.)

Table A

Stor Conf	Feat Dist		
Total Stor	Stor Increment Type I	Stor Increment Type II	Stor Expansion
	8,192 Pos.	16,384 Pos.	16,384 Pos.
(A) 40,960	0	0	0
(B) 49,152	1	0	0
(C) 57,344	0	1	0
(D) 65,536	1	0	1
(E) 73,728	0	1	1
(F) 81,920	1	1	1
(G) 90,112	0	2	1
(H) 98,304	1	2	1
(I) 106,496	0	3	1

Notes:

1. Field installation of Storage Increment - Type I is only recommended in changing from configurations A, E and G. Storage Increment - Type II is not used in configuration A, B and D.

2. Customers who elect to purchase Storage Increment - Type I and later order additional storage should consider purchase of Storage Increment - Type II initially because some field upgrades of storage may require replacement of initial feature and installation of new feature.

**Synchronous Clock and CCITT Interface (#2858):** This feature provides interface for the host communication adapter for attachment of the 3976 Modem mdl 3 or a supported PTT-mandatory modem at 1200/600 bps. See M2700 pages for details. Operation at 600 or 1200 bps is selectable. Maximum: One. In Japan, #2946 must be specified to satisfy the NTT's DTE Self-Test requirements when attaching a non-IBM modem. Note: Required with specify code #2982.

**Direct Attachment 3704/3705 (#2863):** This feature, which operates at 2400 bps, provides the user (whose 3651 Store Controller, mdl A50 or B50 is located within 100 feet of a 3704 or 3705 Communications Controller with the ability to cable-connect these units without modems and a carrier communication line. Prerequisites: 3704 or 3705 must be equipped with Line Set, Type 1F (#4716). Field Installation: Yes. Note: With this feature, a 6m (20 ft) external modem cable is provided which is connected to the cable from the 3704 or 3705.

**IML-Write Adapter (#4633):** Provides the 3651 with the ability to write an IML (Initial Machine Load) tape on a user-provided tape cassette recorder (refer to "IBM 3650 Retail Store System Introduction Manual", GA27-3075), to be read by a Point-of-Sale terminal equipped with the IML-Read Adapter (#4632) feature. Maximum: One. Field Installation: Yes.

**Local Loop Adapter, Add'l (#4882):** This feature provides a second or third Local Loop Adapter on the 3651. Up to a maximum of 64 terminals can be attached to each additional Loop. The actual number of terminals will depend upon the program capacity and time requirements of the 3651 to service the Loops as well as the communication link to the Host processor (see "Terminal Devices" above). Limitations: Cannot exceed a total of three Loop Adapters (local or remote) per 3651. Maximum: Two. Field Installation: Yes. Specify: See Figure 1.

**9600 bps Loop Adapter (#4890):** Provides a 9600 bps local Loop Adapter. Available in lieu of a second or third Local Loop Adapter. The feature provides for the attachment of 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) feature installed. The actual number of 3275 Display Station mdl 3s installed will depend upon program capacity and time requirements of the 3651 to service the Loops and the communication link to the Host processor (see "Terminal Devices" above). Limitations: Cannot exceed a total of three Loop adapters (local or remote) per 3651. Only 3275 Display Station mdl 3s with 9600 bps Transmission Speed (#7825) can be attached to this Loop adapter. Maximum: One. Field Installation: Yes. Specify: See Figure 1.

**Remote Loop Adapter (#6111):** Provides online service for up to 12 remote sites per Remote Loop Adapter. Available in lieu of a second or third Local Loop Adapter. The feature provides an interface to a 3872 Modem or equivalent PTT-listed modem on site which via leased line connects to a 3659 Remote Communications Unit at each remote site. This allows for extension of the Loop to up to (1) three remote locations, with a 3659 at each site, (2) 12 remote locations, with a 3659 mdl 2 (multipoint) at each site, with a total of 64 terminals per Loop (see "Terminal Devices" above). The 3651 treats the remote Loop as if it were a local Loop. Limitations: Cannot exceed a total of three Loop adapters (local or remote) per 3651. Maximum: Two. Field Installation: Yes. Prerequisites: One 3872 Modem or equivalent PTT-listed modem with Point-to-Point (#6101) feature, Multipoint (no feature or #6302) or equivalent PTT-listed modem per Remote Loop Adapter at 3651 site and a 3659 Remote Communications Unit at each remote site. When more than one remote site is attached using 3659 mdl 1, a half-duplex 2-wire terminated, non-switched voice grade line is required between the 3651 and the first remote site, between successive remote sites, and from the last remote site back to the 3651. When only one remote site is to be attached, a duplex, 4-wire terminated nonswitched voice grade line is required. When using the 3659 mdl 2 for more than one remote site, 4-wire duplex multipoint service is required.

**3784 Adapter (#8154):** Provides the capability to directly attach one 3784 Line Printer mdl 1 to the 3651 controller. Fixed length cables are supplied as standard. Refer to "3650 PSS Installation Manual -- Physical Planning", GA27-3167. Maximum: One. Field Installation: Yes. Prerequisites: #9716 on the 3784. Minimum storage required on the 3651 is 48K.

**Note:** For attachment of the 3784 Line Printer, the controller must have EC 349850 applied and operating under RSS/Host Support Release 3. New 3651 controllers must have #9503 specified.

Figure 1

Loop Adapter Position	Loop *Adapter	Special Feature	Specify Code
2	Add'l	#4882	#9442
	Local		
	Remote	#6111	#9552
	9600 bps	#4890	#9662
3	Add'l	#4882	#9443
	Local		
	Remote	#6111	#9553
	9600 bps	#4890	#9663

\* Loop Adapter Position 1 is occupied by the standard Local Loop Adapter. For Loop Adapter Position 2 and 3, either an Add'l Local (#4882) or Remote (#6111) or 9600 bps (#4890) Loop Adapter may be ordered. For each one ordered, also specify the applicable #9XXX code from the chart above. The 9600 bps Loop Adapter (#4890) may be ordered only once.

## MODEL CONVERSIONS

The following model changes can be made in the field:

From	To		
	B50	A75	B75
A50	X*	X	X*
B50			X

\* These model changes require the replacement of the integral disk storage. Adequate provision must be made for retaining data contained on the replaced disk storage at the host location so it can be transmitted to the new disk storage.

On purchased model 50 to model 75 changes, either Local Loop Adapter, Add'l (#4882 with #9442 or #9443) or Remote Loop Adapter (#6111 with #9552 or #9553) is a prerequisite on the model 50.

Customers who elect to purchase the 3651 model A50 or B50 and Storage Increment Type I (#1559) should consider the model A75 or B75 initially as field conversions to the model A75 or B75 require the replacement of this feature.

## ACCESSORIES

**Cables (P/N 5165886):** Bulk Indoor Loop Cable to attach 3660 units may be purchased from IBM or a customer-selected source. See "Physical Planning Manual", GA27-3074, or "3680 Site Planning and Site Preparation Guide", GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM.

**Cables (P/N 7838695):** Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b.) Maximum allowable cable temperature range is -34 C to +105 C. This Bulk Indoor Loop Cable P/N 7838695 should be ordered in multiple lengths of 304.8m (1,000 ft). Warranty: Loop Cable is warranted free from defects of workmanship and materials for 90 days.

## Loop Accessories

**Female Loop Connector (P/N 5162880):** The Female Loop Connectors will be used in all positions of the 3650 Store Loops where terminals will potentially be installed. The corresponding male connector will either be the plug provided on each terminal or, in the case of the loop position currently not occupied by a terminal, the Loop Shorting Plug (see below).

**Loop Shorting Plug (P/N 1860198):** The Loop Shorting Plug will be used in all 3650 Store Loop positions that are not occupied by terminals. See "3650 Physical Planning", GA27-3074, for details.

**Store Loop Polarity Tester (P/N 1859559):** \*\* The Store Loop Polarity Tester is used by the customer to check Loop wiring prior to installing 3650 systems. One is provided at no charge for each 3651 site. See "Specify" section. For details, see "3650 Physical Planning Manual", GA27-3074.

## SUPPLIES

Contact IBM.

**3651 STORE CONTROLLER MDLS A60, B60****PURPOSE**

The control unit for a 3660 Supermarket System. Controls all functions of the 3663 Supermarket terminals. A 3669 adapter is included, which allows communication at 2400 bps over appropriate communication facilities with a properly equipped S/370, 30XX, or 4300 processor. The Dual Communications Adapter feature allows communications at 600/1200 bps with the host S/370, 30XX, or 4300 processor over switched network facilities. For backup purposes, the control unit, through the 3669 Store Communications Unit, can also communicate with and control 3663 Supermarket terminals in one other preassigned location. See "Communication Facilities" and "Prerequisites".

**MODELS A60, B60**

**Model A60:** 5 megabytes of integral disk storage

**Model B60:** 9.3 megabytes of integral disk storage

**HIGHLIGHTS**

Up to 24 3663 Supermarket terminal stations can be attached to a 3651 mdl A60 or B60 in one store. Each 3663 mdl 1 or each 3663 mdl 2 counts as 1 out of the 24. In addition, for backup purposes, a 3651 mdl A60 or B60 can control all the 3663 Supermarket terminals that are normally controlled by the other pre-assigned 3651 mdl A60 or B60 (normally at another location).

The 3651 mdl A60 or B60 (using the 3663 Supermarket Terminal) supports the following functions, in most combinations.

**Customer Checkout:**

- Automatic pricing through code lookup in a master price file
- Automatic handling of multiple priced items
- Automatic handling of mix and match group pricing
- Automatic distribution of net sales by department (up to 54)
- Automatic application of transaction discounts
- Automatic computation of sales taxes with automatic handling of taxable and non-taxable items
- Provision for tax exempt transactions
- Automatic control of maximum value of food stamps that should be accepted
- Check authorization facilities (positive or negative) through lookup against a check authorization record
- Computation of change due

All functions can be controlled to inhibit initiation by unauthorized personnel. Many capabilities which are available but are not applicable can be disabled at generation time via SDR (System Definition Records).

**Store Support:**

- Preparation of the following accounting reports:
  - Store summary
  - Individual cashier performance and tender reconciliation
  - Store office tender reconciliation
  - Sales by department (up to 54)
  - Distribution of miscellaneous income and disbursements by account
- Current inquiries for department sales, cashier performance and cash position, and store cash position
- Inquiries and changes to master price records and operator authorization control records
- Setting time and date for the internal clock
- Customer checkout training mode
- Printing miscellaneous messages received previously from the host S/370, 30XX, or 4300 processor

- Entry of miscellaneous messages for subsequent retrieval by the host S/370, 30XX, or 4300 processor
- Reporting of items returned by customers which are returned to stock
- Updating the system with data received from the host S/370, 30XX, or 4300 processor
- Shelf Label preparation

The above functions are compatible with variable length reconciliation periods, e.g., daily or weekly, and they are compatible with 24-hour store operation. All functions are individually controlled to inhibit initiation by unauthorized personnel.

**Data Accumulation:** The 3651 mdl A60 or B60 accumulates the following by-product data for subsequent retrieval by the host: Item movement totals, all accounting and performance totals used in store reports, totals of taxes and taxable sales, productivity totals for each terminal station in 15 minute increments, check authorization data requested, and individual logged entries covering coupons received, exception events, and security sensitive events.

**Host S/370, 30XX, or 4300 Processor Transmission:** The 3651 mdl A60 or B60 can transmit to the host, upon receiving a request, all of the data shown under "Data Accumulation", and other data, or records in the 3651. The 3651 will clear out data or records upon request by the host. The 3651 can receive records, record changes, commands or other pertinent data from the host.

**Communication Facilities:** For in-store operation, two store loops provide the communications linkage to the 3663 Supermarket terminals. See "Installation Manual - Physical Planning", GA27-3079.

The communications adapter permits operation over PTT-supplied C2, C3 or D5 facilities for out-of-store communications. For information concerning that facility, see M2700 pages.

**Prerequisites:**

A 3669 Store Communications Unit or a 3663 mdl 1 is prerequisite to add a 3663 mdl 2.

A properly equipped S/370, 30XX, or 4300 processor must be available. The S/370 must contain a virtual storage processor and can be any virtual storage S/370, 30XX, or 4300 processor. One of the following must be utilized:

- 3704, 3705, or 3725 Communications Controller, equipped with appropriate features.
- ICA feature on S/370 mdls 115, 125, 135, 135-3, 138.
- Communication Adapter Feature on 4331 Processor.

**Limitations:** The modem used by the 3704, 3705, 3725 or Communications Adapter on 4331 Processor must be either a 3872 or equivalent, an IBM 2400 bps Integrated modem or equivalent, 3976 mdl 3 or a PTT-mandatory modem with switched network features.

The Dual Communications Adapter is required if 600/1200 bps switched host communications and 2400 bps nonswitched backup communication is to be used. In Australia and New Zealand, host communications will be handled at 600/1200 bps on switched lines using either the Datel Switched Service Plan 32E or the Post Office Datel 600 Mandatory Service.

The Dual Communications Adapter is required if 600/1200 bps switched host communications and 2400 bps nonswitched backup communications is to be used.

**Publications:** GA27-3076

**SPECIFY**

- Power (AC, 1-phase):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
235V #2814	230V #9904

(Japan only > For 100V 50/60 Hz, see RPQ 780210 for ordering instructions, prerequisites and limitations.<)

- RFI Standard: The RFI Standard #2759 is now provided on all machines as standard.
- Communications: #9071 for Binary Synchronous Communication, or #9072 for Synchronous Data Link Control Communication.
- Machine Nomenclature:
 

Canadian Eng #2934	Italian #2932
Canadian Fr #2935	Spanish #2931
French #2928	UK English #2927
German #2929	US English #2750

- Controller Designation: Specify #9491 on the first 3651 to be used with a host system location and #9492 on each additional 3651 in the network.

Note: The physical location of the host system is required to be specified on the order when #9491 is specified. When #9491 is specified, additional information must be specified as follows:

- Specify one of the following to indicate magnetic tape density (media) used at the host system location. This tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.
  - #9412 -- 9-track 800 bpi
  - #9413 -- 9-track 1600 bpi
  - #9414 -- 9-track 6250 bpi

The 3651 controller data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

- Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

Line 1 -- IBM Programming Systems Representative  
 Line 2 -- c/o (Name of Customer)  
 Line 3 -- Street Address (or P.O. Box)  
 Line 4 (etc.) -- City, Country, Postal Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code #9491). Whenever controller data is updated by an EC, the EC will be shipped to the most current TPC address.

**Note:** The 3660 Supermarket System Host Support must be ordered from ISD. See SCP pages.

- Store Loop Polarity Tester: Order Store Loop Polarity Tester, P/N 1859559 for site of store Loop wiring. One is furnished at each site at no charge. See "Accessories" for additional Store Loop Polarity Testers.

Notes:

- Tester matches receptacle ("Female Loop Connector"), P/N 5162880. See "Accessories".
- The customer must provide (purchase, install and maintain) all necessary 3650 communication lines within the store. (Bulk Loop cable is available from IBM; see "Accessories".)

### SPECIAL FEATURES

**Dual Communications Adapter (#2901):** This feature provides two separate interfaces to two different modems or services. One

interface attaches a 3669 mdl 3. The other interface attaches the following:

- 3976 mdl 3: All WT countries and where PTT modem is mandatory.

Only one of the two connection paths is active at any one time. The attached modems must include auto answer capability.

Business machine clocking is provided to the modems for speeds of 600/1200 bps. Modem clocking is used for 2400 bps.

This feature is required in countries where a switched network facility at 2400 bps is not supported through the 3669 or RPQ equivalent. Specify: Modem Service (specify one): #2977 for 3976 mdl 3 or PTT-mandatory modems at 1200 bps on switched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin.

**Storage Increment (#7680):** Provides the 3651 with 8,192 bytes of additional control storage. Maximum: One. Field Installation: Yes. System RPQs: The following 3660 System RPQ can be ordered.

- RPQ 7B0211 - PTT-Mandatory Interface on 3669 Store Communications Unit mdl 3 for backup on leased lines where PTT-Mandatory modem is required.

### MODEL CONVERSIONS

Model Changes between the model A50 or B50 and the model A60 or B60 are not recommended for field installation. 3651 features cannot be interchanged between model A60 and a model 50 or 75.

Model changes can be made in the field from model A60 to B60, A75 and B75, and from B60 to B75. Changes from A to B models require the replacement of integral disk storage. This change requires replacement of the integral disk storage. Adequate provision must be made for retaining the data contained on the replaced disk storage. All replaced parts become the property of IBM.

The following model changes can be made in the field:

	To		
	B60	A75	B75
From			
A60	X	X	X*
B60			X

\* These model changes require the replacement of the integral disk storage. Adequate provision must be made for retaining data contained on the replaced disk storage at the host location so it can be transmitted to the new disk storage.

### ACCESSORIES

**Cables (P/N 5165886):** Bulk Indoor Loop Cable to attach 3660 units may be purchased from IBM or a customer-selected source. See "Physical Planning Manual", GA27-3074, or "3680 Site Planning and Site Preparation Guide", GA27-3201, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM. Specify: Bulk indoor loop cable P/N and number of feet desired. Allow a lead time of 120 days.

**Cables (P/N 7838695):** Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b.) Maximum allowable cable temperature range is -34 C to +105 C. "This Bulk Indoor Loop Cable" (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). Allow a lead time of 120 days. Warranty: Loop Cable is warranted free from defects of workmanship and materials for 90 days.

**MACHINES**

**Loop Accessories**

**Female Loop Connector (P/N 5162880):** The Female Loop Connectors will be used in all positions of the 3650 Store Loops where terminals will potentially be installed. The corresponding male connector will either be the plug provided on each terminal or, in the case of the loop position currently not occupied by a terminal, the Loop Shorting Plug (see below).

**Loop Shorting Plug (P/N 1860198):** The Loop Shorting Plug will be used in all 3650 Store Loop positions that are not occupied by terminals. See "3650 Physical Planning", GA27-3074, for details.

**Store Loop Polarity Tester (P/N 1859559):** \*\* The Store Loop Polarity Tester is used by the customer to check Loop wiring prior to installing 3650 systems. One is provided at no charge for each 3651 site. See "Specify" section. For details, see "3650 Physical Planning Manual", GA27-3074.

**SUPPLIES**

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MACHINES

M 3653.1

Jan 85

Major Revision

## 3653 POINT OF SALE TERMINAL

[NO LONGER AVAILABLE]

### PURPOSE

An intelligent input/output terminal for the 3650 Programmable and Retail Store System to provide retail point-of-sale data collection, credit authorization, and inquiry functions. Self-contained intelligence allows the 3653 to continue most sales functions when disconnected from the 3650 system after a parameter initialization from either the Store Controller or Magnetic Wand Reader.

### MODELS

- Model 1 001** Not customer-programmable. Attaches to 3651 models B25, (Canada only - C25, -) A50, B50, A75, B75, C75 and D75.
- Model 1P P01** Customer programmable. Optionally will function as a model 1 (non-customer programmable). Attaches to 3651 models B25, (Canada only - C25, -) A50, B50, A75, B75, C75 and D75. When attached to Model A50 or B50, it can function as a model 1 only. Basic storage is 36K bytes. This may be increased to 60K bytes through installation of Storage Increment features.

### HIGHLIGHTS

A solid state, unitized, packaged unit. It features: data entry via the magnetic wand reader feature and a 10 numeric-key, 19 function-key keyboard; step-by-step display of operator instructions; printing of data in response to an inquiry; display of numeric data as it is being key entered; transmission of data to a 3651 for logging over a unique transmission line capable of handling large volumes of short messages from many terminals; and a cash drawer with removable till.

**Keyboard:** A 10-key numeric pad (machines shipped to the UK will have one additional key for the halfpence) and nineteen function keys provide entry for variable source data. Types of transactions are indicated through the numeric pad, as well as data fields. Once a field has been entered, the depression of a function key causes one or more of the following functions to happen: Editing for minimum and maximum field length; modulo check; price look-up; credit authorization, printing; transmission to the 3651; and, change in guidance or error feedback.

**Printer:** A 3-station printer which produces a cash receipt or sales-check as well as a journal for each transaction.

**Display:** An 8-digit numeric display plus monetary symbol and "--" with five backlit captions shows numeric data as it is being keyed, extended prices, status codes for credit referrals, subtotals, totals, amount due, change, and refund amounts.

**Operator Guidance:** Step-by-step instructions are provided to the operator for each transaction by twenty backlit messages. Additional guidance is provided by the type of transactions shown on the numeric keys.

**Status Indicators:** Advise the operator that the terminal is: ready for use, waiting for a response to an inquiry or transmission to the 3651, offline from its 3651, or that the journal roll take-up spool is full.

**Selectable Functions:** A limited number of additional functions may be selected to further extend the flexibility of the 3653 mdl 1 (or 1P when functioning as a mdl 1).

**Special Contract/Proposal Considerations:** Special contract terms will apply for the purchase and maintenance of the 3653. These terms will relieve IBM of responsibility for any loss of cash contained in a 3653 after its delivery to the customer.

IBM will not provide warranty or maintenance service on a 3653 containing cash. The customer will be responsible for removing, controlling, and replacing cash so that IBM can fulfill its warranty and maintenance obligations. The specific contractual terms will be made available by country headquarters.

The 3653 is maintained under "Central Facility" type maintenance.

**Prerequisites:** The 3650 system controller is a 3651 Store Controller mdl 25, 50 or 75. See M3651 pages for details.

**Proposal/Acknowledgement Letter Statements:** Each Proposal and Acknowledgement letter must include the following statement:

"It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3653 which contains cash or other

valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations.

When a failure occurs in a cash drawer of any 3653 and it cannot be opened prior to maintenance by IBM, the customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

### Customer Responsibilities:

1. The customer must provide (purchase, install, and maintain) all the necessary 3650 communication lines and female connectors within the store. See "Customer Responsibilities" in the M2700 pages for customer responsibilities concerning communication facilities between the 3651 and the host S/370 or 4300 processors, and between the 3651 and remote sites.
2. The customer is responsible for using the IBM-provided problem determination procedures for identifying the failing unit.
3. The use of the magnetic stripe on the merchandise ticket, credit card, and employee badge was chosen for the 3650 Retail Store System because of its advantages over other encoding methods. The encoding on the tickets, cards, and badges contains data integrity formats and check characters. This does not imply, however, that they are not subject to fraud techniques. Implementing of any additional data security is the responsibility of the customer.
4. Because the 3653 terminals are interchangeable, the customer may wish to replace the failing unit with a spare and must be advised to procure sufficient spare units for such use by him.

The number of spare units needed by the customer depends on the number of units he has installed, his application requirements, his physical store location and layout, etc. An estimated minimum number of spare units, based upon the number of units actually installed, is shown in the following table:

Units Installed	Minimum Spare Units Recommended
10-20	1
20-30	2
30-50	3
50-70	4
70-100	5
100 or more	6

**Maintenance:** Installation of 3653s in the immediate sales area may preclude the acceptability of online repair due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer should remove the failing terminal to a repair facility located within the store for subsequent repair. It will be the Customer's responsibility to ascertain this failing terminal and move it to the repair site. At this location the CE will repair and test the terminal online via a customer-provided store loop termination.

**Bibliography:** IBM 3650 Retail Store System Introduction, GA27-3075.

### SPECIFY

- Power (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	208V #9902
220V #2813	230V #9904
235V #2814	

Note: For France only, the higher voltage group is available.

Plugs: Machines are furnished with power plugs selected by country code.

- Machine Nomenclature:

Canadian English #2934	German #2929
Canadian French #2935 *	Italian #2932
English UK #2927	Japanese #2930
English US #2750	Spanish #2931
French #2928	

\* plus RPQ X45628

**3653 Point of Sale Terminal (cont'd)**

RPOs will be accepted for additional nomenclatures not mentioned here. Note: All 3653s shipped to WT countries contain the required special characters for the following countries:

Austria/Germany	Finland/Sweden
Belgium/France	Italy
Canada (English)	Japan
Canada (French)	Portuguese-speaking
Denmark/Norway	Spanish-speaking

The applicable Character Set will be selected by programming and need not be specified here.

- Journal Lock: **#9322** if lock is desired on access cover to journal take-up roll, journal tape supply, and cash receipt tape supply. For additional or replacement locks and keys, see "Accessories".
- Till Cover with Lock: **#9770** if top cover for cash drawer till is desired. For additional tills and covers and additional or replacement cash drawer locks and keys, see "Accessories".
- Till with movable bill dividers: **#9799** if movable bill dividers are desired. Otherwise, a till with fixed bill dividers will be supplied.
- Decimal Quantity Key: Specify **#2901** if the Decimal Quantity Selectable Function is chosen. Provides a key on the 3653 keyboard with appropriate nomenclature is the key position above the "Quantity" key.
- Cash Drawer Lock: The 3653 is equipped with a cash drawer lock. A group of 25 unique lock numbers has been reserved to allow a customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following types on the 3653 order:

<b>#9101</b>	<b>#9106</b>	<b>#9111</b>	<b>#9116</b>	<b>#9121</b>
<b>#9102</b>	<b>#9107</b>	<b>#9112</b>	<b>#9117</b>	<b>#9122</b>
<b>#9103</b>	<b>#9108</b>	<b>#9113</b>	<b>#9118</b>	<b>#9123</b>
<b>#9104</b>	<b>#9109</b>	<b>#9114</b>	<b>#9119</b>	<b>#9124</b>
<b>#9105</b>	<b>#9110</b>	<b>#9115</b>	<b>#9120</b>	<b>#9125</b>

If none is specified, a lock will be selected at random from a larger group of lock types; each 3653 will be shipped with two cash drawer keys. For additional or replacement keys, see "Accessories".

- Adding Machine Layout on Modifiable Keyboard: Specify **#2996** provides an "adding machine" layout of the numeric keys instead of the "touch-tone" pad layout normally shipped on the Modifiable Keyboard feature (**#4990**). Adding machine layout provides a key arrangement of: Top row (7,8,9); middle row (4,5,6); bottom row (1,2,3). **Field Installation:** Not recommended.

**SPECIAL FEATURES**

**Functional Expansion Increment - Type I (#4223):** [Mdl 1] Provides the 3653 with the capability to support additional functions. The capability provided by this feature is equal to that provided by Functional Expansion (#4222) (see Note 1 below). **Limitations:** The third Type I Increment (#4223) cannot be installed on a 3653 with Functional Expansion Increment - Type II (#4224). #4223 is mutually exclusive with #4222 (see Note 2 below for allowable configurations). **Maximum:** Three. **Field Installation:** Yes.

**Functional Expansion Increment - Type II (#4224):** [Mdl 1] Provides the 3653 with the capability to support additional functions. The capability provided by this feature is twice that provided by Functional Expansion Increment - Type I (#4223) (see Note 1 below). **Limitations:** Cannot be installed on 3653 with third Functional Expansion Increment - Type I (#4223). #4224 is mutually exclusive with #4222. See Note 2 below for allowable configurations. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Must have two Functional Expansion Increment - Type I (#4223) installed.

**Storage Increment (#4225):** [Mdl 1P] Provides an additional 8,176 bytes of storage. **Maximum:** Three. **Field Installation:** Yes.

**IML-Read Adapter (#4632):** Provides a means to initialize 3653 terminals when a 3651 Store Controller mdl B25, (Canada only - C25, -) A75, B75, C75 or D75 is unavailable or unable to provide the IML (Initial Machine Load). An adapter is provided for attaching an external tape cassette recorder (refer to *IBM 3650 Retail Store System Introduction*, GA27-3075) and reading data previously recorded at a 3651 equipped with the IML-Write Adapter (#4633). **Maximum:** One. **Field Installation:** Yes.

**Magnetic Wand Reader (#4944):** A hand operated wand used to read single track delta distance encoded magnetic merchandise tickets,

credit cards, and employee badges. The small lightweight wand attached via a four foot long, flexible cord, allows encoded merchandise tickets to be read without removing them from the merchandise. See Notes 3 and 4 below. **Maximum:** One. **Field Installation:** Yes.

**Modifiable Keyboard (#4990):** Provides an alternate keyboard designed to aid in faster keying and in customizing to a user's requirements. Provides up to 16 department motor keys. **Maximum:** One. **Field Installation:** Not recommended.

**Notes:**

- Order Confirmation of allowable or maximum combination of additional functions to be used with Functional Expansion Increments must be obtained from IBM.
- The table below defines Plant Installable configurations and the maximum allowable field upgrades of #4223 and #4224.
- The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request.
- See "Program Loading at Power-On Time" below for other use of wand.

**Number Of Functional Expansion Increments**
**If Plant Installed Configuration is:**

Type I (#4223)	0	0	1	1	2	2	2	3
Type II (#4224)	0	0	0	0	0	0	1	0

**Is Field Upgrade Possible?**

Yes Yes Yes Yes Yes Yes No \*

**Maximum Upgrade Above Plant Installed Configuration Allowable is:**

Type I (#4223)	2	3*	1	2*	1*	0	0	0
Type II (#4224)	1	0	1	0	0	1	0	1*

\* Customers who elect to purchase the third #4223 and anticipate later ordering #4224 should consider purchase of #4224 initially because field upgrade requires the replacement of the third #4223.

**Program Loading at Power-On Time**
**With 3650 Retail Store System Release I:**

3651 Available: The IML and Parameter Initialization are loaded from the 3651 Store Controller.

3651 Unavailable: The IML must be obtained from a back-up 3651 Store Controller Parameter Initialization is accomplished by wand using magnetically encoded tickets with the Magnetic Wand Reader (#4944) at each 3653.

**With Retail Store System Release II and Release III:**

3651 Available: The IML, selectable functions and Parameter Initialization are loaded from the 3651 Store Controller.

3651 Unavailable: The IML, selectable functions and Parameter Initialization requires one 3653 with the IML-Read Adapter (#4632) feature on each local loop and at each remote location.

**With 3650 Programmable Store System:**

3651 Available: This IML is loaded from the 3651 Store Controller.

3651 Unavailable: The IML requires one 3653 with the IML Read Adapter (#4632) feature on each local loop and at each remote location.

**MODEL CONVERSIONS**

Model changes from model 1 to model 1P can be made in the field. All replaced parts of the base model become the property of IBM. The Functional Expansion features (#4222, #4223 and #4224) cannot be interchanged between the model 1 and the model 1P and would remain with the customer if a model change is made.

**ACCESSORIES**

**Cash Till and Cover With Lock:** Additional cash tills and till covers with locks may be ordered.

Cash Till Cover with Lock and Keys P/N 1851126  
Cash Till P/N 1860161



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Note: See "Locks and Keys" later in this section.

**Keyboard Accessories:** The following terms are used in the KEYTOP descriptions:

VERSION	STEM NUMBER/KEY ALIGNMENT
OV	One/Vertical
OH	One/Horizontal
OVH	One/Vertical or Horizontal
TV	Two/Vertical
TH	Two/Horizontal
-B	Small raised projection in keytop
-C	Circular, concave top on key button
-M	Minimal concavity of circular keytop
SIZE	UNITS
Square	1 x 1
Single	1 x 1-1/3
Long	1 x 2
Double	1-1/3 x 2

**Engraved Keytops:** Keytops containing pre-defined messages are available for use on the 3653 terminal keyboards. Blank keytops are also available for customer engraving.

**Retail Keytops:** The following is a list of pre-defined keytops available in the 3650 Retail Store System nomenclature:

World Trade Nomenclature					
NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
<b>Canadian French:</b>					
ANNUL	Red	Square	OH	Std	1854455
1 COMPT	White	Square	OH	Std	1854850
2 SPCL	White	Square	OH	Std	1854851
5 A LIV	White	Square	OH-B	Std	1854853
3 FICHE	White	Square	OH	Std	1855415
4 P LIV	White	Square	OH	Std	1855416
6 PLAN A	White	Square	OH	Std	1855417
7 PLAN B	White	Square	OH	Std	1855418
8 PLAN C	White	Square	OH	Std	1855419
9 PLAN D	White	Square	OH	Std	1855420
ENTREE DE DONNEES	Blue	Single	OH	Std	1854511
CODE NON MDISE	Blue	Single	OH	Std	1854512
CODE REDUCT	Blue	Single	OH	Std	1854515
RAYON	Blue	Single	OH	Std	1854516
ARTICLE	Blue	Single	OH	Std	1854519
QTE	Blue	Single	OH	Std	1854520
CODE TAXE	Blue	Single	OH	Std	1854523
CLASSE	Blue	Single	OH	Std	1854541
SOUS- TOTAL	Blue	Single	OH	Std	1854854
VERSEMT	Blue	Single	OH	Std	1854421
SANS TAXE	Blue	Single	OH	Std	1855422
CODE ESCOMPTE	Blue	Single	OH	Std	5994141
RETOUR	Blue	Single	OH	Std	5994142
O NON VENTE	White	Long	OV	Std	1854500
REST CLAVIER	White	Long	OH	Std	1854833
TOTAL	Blue	Double	OV	Std	1853906
ENTREE	Blue	Double	OV	Std	1854497
MODIF ETIQ	Blue	Double	OV	Std	1854834
NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
<b>France:</b>					
ANNUL	Red	Square	OH	Std	1854455
1 COMPT	White	Square	OH	Std	1854850
2 SPCL	White	Square	OH	Std	1854851
5 A LIV	White	Square	OH-B	Std	1854853
3 FICHE	White	Square	OH	Std	1855415
4 P LIV	White	Square	OH	Std	1855416
6 PLAN A	White	Square	OH	Std	1855417
7 PLAN B	White	Square	OH	Std	1855418
8 PLAN C	White	Square	OH	Std	1855419
9 PLAN D	White	Square	OH	Std	1855420
ENTREE DE DONNEES	Blue	Single	OH	Std	1854511
CODE NON MDISE	Blue	Single	OH	Std	1854512
RENDU	Blue	Single	OH	Std	1854513
CODE REDUCT	Blue	Single	OH	Std	1854515
RAYON	Blue	Single	OH	Std	1854516
FAMILLE	Blue	Single	OH	Std	1854517
ARTICLE	Blue	Single	OH	Std	1854519
QTE	Blue	Single	OH	Std	1854520
CODE REMISE	Blue	Single	OH	Std	1854522
CODE TAXE	Blue	Single	OH	Std	1854523

SOUS- TOTAL	Blue	Single	OH	Std	1854854
VERSEMT	Blue	Single	OH	Std	1854421
SANS TAXE	Blue	Single	OH	Std	1855422
ANNUL	Red	Single	OH	Std	5188395
CODE TVA	Blue	Single	OH	Std	5188400
PAIEMENT	Blue	Single	OH	Std	5188401
RENDU	Red	Single	OH	Std	5188404
CODE REMISE	Red	Single	OH	Std	5188417
CODE REDUCT	Red	Single	OH	Std	5188418
MODIF ETIQ	Blue	Single	OH	Std	5188419
EFFACER	White	Single	OH	Std	5188420
O NON VENTE	White	Long	OV	Std	5188422
REST CLAVIER	White	Long	OH	Std	1854500
VENTE	White	Long	TH	Std	1854833
TOTAL	Blue	Double	OV	Std	5188416
ENTREE	Blue	Double	OV	Std	1853906
MODIF ETIO	Blue	Double	OV	Std	1854497
EFFACER	White	Double	TV	Std	1854834
MODIF ETIQ	Blue	Double	TV	Std	5188407
ENTREE	Blue	Double	TV	Std	5188408
QTE	Blue	Double	TV	Std	5188411
TOTAL	Blue	Double	TV	Std	5188412
ENTREE	Blue	Double	TV	Std	5188413
				R-1/8	5188421

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
<b>Germany:</b>					
STORN	Red	Square	OH	Std	1854465
1 BAR	White	Square	OH	Std	1854466
2 SOND	White	Square	OH	Std	1854467
3 SCHCK	White	Square	OH	Std	1854468
4 NACHN	White	Square	OH	Std	1854469
5 RUCKL	White	Square	OH-B	Std	1854470
6 KRD-A	White	Square	OH	Std	1854471
7 KRD-B	White	Square	OH	Std	1854472
8 KRD-C	White	Square	OH	Std	1854473
9 KRD-D	White	Square	OH	Std	1854474
3 BELEG	White	Square	OH	Std	1854475
5 RUCKL	White	Square	OH	Std	5188456
MWST	Blue	Single	OH	Std	5188476
RUCK GABE	Blue	Single	OH	Std	1650751
ZAHLUNG	Blue	Single	OH	Std	1854526
NACH-LASS	Blue	Single	OH	Std	1854527
ABTEILG	Blue	Single	OH	Std	1854528
WARENGR	Blue	Single	OH	Std	1854529
ARTIKEL NR	Blue	Single	OH	Std	1854530
MENGE	Blue	Single	OH	Std	1854531
ZWISCH SUMME	Blue	Single	OH	Std	1854532
KEINE ART-NR	Blue	Single	OH	Std	1854533
RABATT	Blue	Single	OH	Std	1854836
DATEN EINGABE	Blue	Single	OH	Std	1854837
STORNO	Red	Single	OH	Std	1855429
RUCKGABE	Blue	Single	OH	Std	5188446
ABTEILG	Blue	Single	OH	Std	5188447
RABATT CODE	Blue	Single	OH	R-1/8	5188452
NACHLASS CODE	Blue	Single	OH	Std	5188453
ABTEILG	Blue	Single	OH	Std	5188457
ETIKETT ANDERN	Blue	Single	OH	Std	5188477
EINGABE	Blue	Single	OH	Std	5188478
EINGABE	Blue	Single	OH	R-1/8	5188480
BAR	Blue	Single	OH	Std	5188482
./.	Blue	Single	OH	Std	5188483
LOSCHEN	White	Long	OH	Std	5996913
O KEIN VERK	White	Long	OV	Std	1854504
O KEIN VERK	White	Long	TH	Std	1854505
ETIKETT ANDERN	Blue	Double	OV	Std	5188468
EINGABE	Blue	Double	OV	Std	1854498
END SUMME	Blue	Double	OV	Std	1854501
LOSCHEN	White	Double	TV	Std	1854502
ETIKETT ANDERN	Blue	Double	TV	Std	5188459
EINGABE	Blue	Double	TV	Std	5188460
MENGE	Blue	Double	TV	R-1/8	5188463
END SUMME	Blue	Double	TV	R-1/8	5188464
ETIKETT ANDERN	Blue	Double	TV	Std	5188465
MENGE	Blue	Double	TV	Std	5188479
END SUMME	Blue	Double	TV	Std	5188484
				R-1/8	5188485

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
<b>Italy:</b>					
ANNUL	Red	Square	OH	Std	1854455
1 CONT	White	Square	OH	Std	1854475

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2 SPEC	White	Square	OH	Std	1854476
3 DOCUM	White	Square	OH	Std	1854477
4 PAC	White	Square	OH	Std	1854478
5 PREN	White	Square	OH-B	Std	1854479
6 CR A	White	Square	OH	Std	1854480
7 CR B	White	Square	OH	Std	1854481
8 CR C	White	Square	OH	Std	1854482
9 CR D	White	Square	OH	Std	1854483
CODICE IVA	Blue	Single	OH	Std	1752493
IMMISS DATI	Blue	Single	OH	Std	1854535
DIVERSI	Blue	Single	OH	Std	1854536
RESO- ACCRED	Blue	Single	OH	Std	1854537
PAGAM	Blue	Single	OH	Std	1854538
RIDUZ PREZZO	Blue	Single	OH	Std	1854539
REPARTO	Blue	Single	OH	Std	1854540
CLASSE	Blue	Single	OH	Std	1854541
ARTIC	Blue	Single	OH	Std	1854542
QUANT	Blue	Single	OH	Std	1854543
TOTALE PARZ	Blue	Single	OH	Std	1854544
TIPO SCONTO	Blue	Single	OH	Std	1854545
ANNUL	Red	Single	OH	Std	5188395
RESO- ACCRED	Red	Single	OH	Std	5188499
REPARTO	Brown	Single	OH	R-1/8	5188502
TIPO SCONTO	Red	Single	OH	Std	5188503
CLASSE	Brown	Single	OH	R-1/8	5188504
RIDUZ PREZZO	Red	Single	OH	Std	5188505
ARTIC	Brown	Single	OH	R-1/8	5188507
CONT	Blue	Single	OH	Std	5188514
./.	Blue	Single	OH	Std	5996913
AZZERO	White	Long	OH	Std	1854508
O CASSA	White	Long	OV	Std	1854509
O CASSA	White	Long	TH	Std	5188513
MODIF ETICH	Blue	Double	OV	Std	1854503
REGISTR	Blue	Double	OV	Std	1854506
TOTALE	Blue	Double	OV	Std	1854507
REGISTR	White	Double	TV	R-1/8	1650333
TOTALE	White	Double	TV	R-1/8	1650334
AZZERA	White	Double	TV	R-1/8	5188508
MODIF ETICH	Blue	Double	TV	Std	5188509
QUANT	Blue	Double	TV	Std	5188511
MODIF ETICH CONT	Blue	Double	TV	Std	5188515
CONT	Blue	Double	TV	Std	5188539

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
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**Spain:**

ANUL	Red	Square	OH	Std	1648534
4 PCE	White	Square	OH	Std	1648538
5 SENAL	White	Square	OH-B	Std	1648539
1 CONT	White	Square	OH	Std	1854475
2 ESPCL	White	Square	OH	Std	1854787
3 M ESP	White	Square	OH	Std	1854788
6 CGO A	White	Square	OH	Std	1854791
7 CGO B	White	Square	OH	Std	1854792
8 CGO C	White	Square	OH	Std	1854793
9 CGO D	White	Square	OH	Std	1854794
FAMIL	Blue	Single	OH	Std	1648535
REF	Blue	Single	OH	Std	1648536
CODIGO DE BONIF	Blue	Single	OH	Std	1648537
SUB TOTAL	Blue	Single	OH	Std	1853925
ENTRADA DATOS	Blue	Single	OH	Std	1854771
CODIGO DE VACIO	Blue	Single	OH	Std	1854772
CREDITO DEVOLCN	Blue	Single	OH	Std	1854773
PAGO	Blue	Single	OH	Std	1854774
DEPTO	Blue	Single	OH	Std	1854776
CANT	Blue	Single	OH	Std	1854778
CODIGO DESCTO	Blue	Single	OH	Std	1854779
CODIGO IMPSTO	Blue	Single	OH	Std	1854780
ANUL	Red	Single	OH	Std	5188540
DEPTO	Blue	Single	OH	R-1/8	5188541
FAMIL	Blue	Single	OH	R-1/8	5188542
REF	Blue	Single	OH	R-1/8	5188543
MODIF ETIQ	Blue	Single	OH	Std	5188548
MODIF ETIQ	Blue	Single	OH	R-1/8	5188550
INTRO	Blue	Single	OH	R-1/8	5188551
INTRO	Blue	Single	OH	Std	5188552
./.	Blue	Single	OH	Std	5996913
BORRADO	White	Long	OH	Std	1854783
NO VENTA	White	Long	OV	Std	1854784
NO VENTA	White	Long	TH	Std	5188547
TOTAL	Blue	Double	OV	Std	1853906
INTRO	Blue	Double	OV	Std	1854782
MODIF ETIQ	Blue	Double	OV	Std	1854834

TOTAL	Blue	Double	TV	Std	5188413
CONT	Blue	Double	TV	Std	5188539
BORRADO	White	Double	TV	R-1/8	5188544
INTRO	Blue	Double	TV	R-1/8	5188545
CANTIDAD	Blue	Double	TV	Std	5188546
MODIF ETIQ	Blue	Double	TV	R-1/8	5188549
TOTAL	Blue	Double	TV	R-1/8	5188555
MODIF ETIQ	Blue	Double	TV	R-1/8	5188578
MODIF ETIQ	Blue	Double	TV	Std	5189668

**Japan:** A selection of engraved keytops in Japanese nomenclature is available for ordering by the customer.

**Blank Keytops:** The following is a list of blank keytops which are available for customer engraving:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
(all blank)	White	Square	OH-CM	R-1/8	1648413*
	White	Square	OH-CB	Std	1752491*
	White	Square	OH	Std	1853928*
	White	Square	OH-B	Std	1853930*
	White	Square	OH-CM	Std	1854184*
	White	Square	OH-C	Std	1854185*
	White	Single	OVH	Std	1762468*
	Yellow	Single	OVH	Std	1762469*
	Black	Single	OVH	Std	1762470*
	Brown	Single	OVH	Std	1762471*
	N-M Br	Single	OVH	Std	2688797*
	White	Single	OH	R-1/8	1762506*
	Red	Single	OH	R-1/8	1762507*
	Blue	Single	OH	R-1/8	1762508*
	Green	Single	OH	R-1/8	1762509*
	Yellow	Single	OH	R-1/8	1762510*
	Black	Single	OH	R-1/8	1762511*
	Brown	Single	OH	R-1/8	1762512*
	White	Single	OH	R-1/4	1762513*
	Red	Single	OH	R-1/4	1762514*
	Blue	Single	OH	R-1/4	1762515*
	Green	Single	OH	R-1/4	1762516*
	Yellow	Single	OH	R-1/4	1762517*
	Black	Single	OH	R-1/4	1762518*
	Brown	Single	OH	R-1/4	1762519*
	Blue	Single	OVH	Std	1853914*
	Green	Single	OVH	Std	1854182*
	Red	Single	OVH	Std	1854183*
	White	Long	TH	R-1/8	1648415*
	White	Long	TH	Std	1648417*
	White	Long	OV	Std	1853909*
	White	Long	OH	Std	1855439*
	Red	Double	TV	R-1/4	1648405*
	Blue	Double	TV	R-1/4	1648406*
	Green	Double	TV	R-1/4	1648407*
	Yellow	Double	TV	R-1/4	1648408*
	Black	Double	TV	R-1/4	1648409*
	Brown	Double	TV	R-1/4	1648410*
	White	Double	TV	Std	1762522*
	Red	Double	TV	Std	1762523*
	Blue	Double	TV	Std	1762524*
	Green	Double	TV	Std	1762525*
	Yellow	Double	TV	Std	1762526*
	Black	Double	TV	Std	1762527*
	Brown	Double	TV	Std	1762528*
	White	Double	TV	R-1/8	1762533*
	Red	Double	TV	R-1/8	1762534*
	Blue	Double	TV	R-1/8	1762535*
	Green	Double	TV	R-1/8	1762536*
	Yellow	Double	TV	R-1/8	1762537*
	Black	Double	TV	R-1/8	1762538*
	Brown	Double	TV	R-1/8	1762539*
	White	Double	TV	R-1/4	1762540*
	N-M Br	Double	TV	Std	2688798*
	Blue	Double	OV	Std	1853905*
	White	Double	OV	Std	1854181*

**Universal Keytops:** Keyboard accessories are available which allow the customer to define and to change the messages on the keytops on the 3653 Retail terminals. These accessories consist of legendar keytops and sheets of blank labels to use on these keytops.

The universal keytops come in the four standard sizes and in two heights. They consist of two parts; a white bottom button and a clear plastic cover. Blank labels for the various keytop sizes may also be ordered. These labels come in various colors and may be printed with



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either black or white ink. The user may define unique key button messages, print these messages on the desired color label, affix the printed color label to the white bottom key button and snap on the clear protective cover. Extra clear plastic covers are also available for use as spares.

to the new ribbon drive mechanism should use P/N 1136660 or equivalent.

Contact IBM.

ITEM	COLOR	SIZE	VERSION	HEIGHT	P/N
Keytop	White	Square	OH	Std	5188767*
Keytop	White	Single	OVH	Std	5188768*
Keytop	White	Single	OH	R-1/8	5188769*
Keytop	White	Long	TH/TV	Std	1642499*
Keytop	White	Long	OV	Std	5188771*
Keytop	White	Long	OH	Std	5188772*
Keytop	White	Double	OV	Std	5188773*
Keytop	White	Double	TV	Std	5188774*
Keytop	White	Double	TV	R-1/8	8627316*
Cover	Clear	Square	--	--	5188751*
Cover	Clear	Single	--	--	5188754*
Cover	Clear	Long	--	--	5188757*
Cover	Clear	Double	--	--	5188760*

ITEM	COLOR	SIZE	DECALS/SHEET	P/N
Labels	White	Square	102 decals/sheet	5194900*
Labels	White	Single	68 decals/sheet	1756848*
Labels	Yellow	Single	68 decals/sheet	5194901*
Labels	Red	Single	68 decals/sheet	5194902*
Labels	Blue	Single	68 decals/sheet	5194903*
Labels	Green	Single	68 decals/sheet	5194904*
Labels	Brown	Single	68 decals/sheet	5194905*
Labels	White	Long	42 decals/sheet	5194906*
Labels	White	Double	28 decals/sheet	5194907*
Labels	Red	Double	28 decals/sheet	5194908*
Labels	Blue	Double	28 decals/sheet	5194909*

**Key Stops (P/N 1650058):** \* The key stop is a small ring collar which is placed over the stem of a keybutton and under the keytop. The collar holds the keytop in the up position and prevents its use.

**Keytop Extractor (P/N 1647720):** The keytop extractor is a small plier-like device which fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on the keytop and it may be pulled off its stem. The customer may find this helpful when adding key stops, universal keytops, or in doing any rearranging of the keyboard.

Two keytop extractors are supplied with each 3651 controller. The customer may desire additional extractors.

**Locks and Keys:** The 3653 is equipped with a cash drawer lock and can be equipped with an optional journal lock (#9322). The terminal is shipped with two cash drawer keys. The cash drawer lock will be randomly selected unless specified otherwise. If the customer wishes to add or replace keys or locks with a specific identification number (stamped on lock and key) he should state the 3653's machine serial number and the key identification number. **Note:** Without a Key Identification Number, the order should state Machine Serial Number and the words "NEW LOCK REQUIRED". If the optional journal lock is specified, the terminal will be shipped with two journal keys also. Additional or replacement keys may be purchased from IBM or a local locksmith. Cash Drawer Lock Key blank part numbers are listed below if the customer requires key blanks and/or for replacement keys if ordered from IBM. Locks may be changed in the field. Allow eight weeks for shipment.

3653 Cash Drawer Lock (including two keys), P/N 1851086

3653 Journal Lock, P/N 5998329

3653 Journal Lock Key, P/N 5182265\* (order by machine type and P/N)

3653 Cash Drawer Lock Key, (order by machine type, lock serial number, and key P/N from the following chart):

Lock Serial Number	Lock Key Blank P/N
H2601 - H2800	8549431
H2801 - H3000	8549482
H3001 - H3200	6021144
H3201 - H3400	6021145

**Note:** For each set of keys, specify machine serial number, key type (cash drawer or journal), key identification number (stamped on key).

### SUPPLIES

**Ribbons:** A black ribbon cartridge, P/N 1136970 or equivalent, should be used for machines installed prior to June, 1975. Machines installed after this date and those machines previously installed that are changed

## 3657 TICKET UNIT

### PURPOSE

Magnetic Merchandise Ticket Input/Output Unit for the 3650 Programmable and Retail Store System.

### MODELS

Model 1 001

**Maximum:** The maximum number of 3657s that can be attached to a 3651 depends upon the number of positions available and the traffic volumes and response times required.

**Prerequisites:** An available loop position.

### HIGHLIGHTS

The 3657 is an online, high-speed batch ticket encoder that can also perform batch ticket reading. Tickets are one inch high and contain a magnetic stripe 1/4-inch wide that runs the length of the ticket. The 3657 encodes this stripe with machine readable data which is read by the 3657 or by a wand reader available on the 3653 Point of Sale Terminal. Tickets also contain two lines of human readable data.

Two general types of tickets are used. For additional ticket types, contact IBM for details.

Two types of tickets used:

- (1) Label -- 1-inch x 1-inch self-adhering paper stock with a protective backing. The 1-inch x 1-inch label dimension applies to label and backing. The label when detached is approximately 0.940-inch x 0.940-inch.
- (2) Tag -- 1-inch x 2-inch and 1-inch x 3-inch heavy-duty paper stock attached to merchandise by hanging or stapling.

**Input:** 1-, 2- or 3-inch roll stock or 2-inch individual tags.

**Batch Reading:** Individual 2-inch tickets can be read from a cartridge. Tickets are fed from a removable cartridge and, if successfully read, directed to a ticket bin. Tickets that are unsuccessfully read are stacked into an identical cartridge. Additional or replacement cartridges can be ordered.

**Output:** 1-, 2- or 3-inch roll, strip or 2-inch individual tags.

**Rated Speed:** Speed is dependent on length of ticket, number of header tickets, output method selected and competing traffic on the Loop.

**Header Tickets:** Are print-only tickets which may be interspersed in the ticket output stream for batch or purchase order identification. Header tickets are not considered as merchandise identifiers.

#### Tickets per Minute

Ticket Size	Approximate Speed
1-inch roll	500
2-inch roll	250
3-inch roll	167
2-inch individual	130 (both make mode and read mode)

**Printing:** The two lines of human readable data are printed with two identical 8-wire matrix print heads. Characters are 0.117 inch high spaced 12 characters per inch. A 64-character set oriented to the retail industry is provided. Uses a cassette ribbon replaceable by the customer ... Contact IBM.

#### Ticket Data Content

Ticket Size	No. Characters	
	Encode	Print
1-inch	19	22
2-inch	40	42
3-inch	60	64

### SPECIFY

- Power (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
200V #2806	
220V #2813	
235V #2814	

- Machine Nomenclature:

English UK #2927	Italian #2932
English US #2750	Japanese #2930
French #2928	Spanish #2931
German #2929	

- Graphic Feature:

English UK #2958	Italy #2968
English US #2956	Japan #2955
France #2964	Spanish Speaking #2969
Germany #2957	

- Katakana Graphic Print: #2894, if desired. This feature provides a 121-character set consisting of 57 Katakana (Japanese) characters in addition to the standard set of 64 characters.

### MODEL CONVERSIONS None

### ACCESSORIES

**Hopper/Stacker Cartridge (P/N 5560620):** The 3657 is shipped with two hopper/stacker cartridges. Additional or replacement cartridges may be purchased.

### SUPPLIES

Merchandise tickets may be purchased from the National Distribution Division. For information pertaining to prices and delivery schedules, contact IBM.

**MACHINES**
**3661 STORE CONTROLLER**

[NO LONGER AVAILABLE]

**PURPOSE**

The control unit for a 3660 Supermarket Key-Entry System controls all functions of the 3663 Supermarket terminals and provides for communication with the appropriate Host System. See "Communication Facilities" and "Prerequisites".

**MODELS**

**Model 1 001** A controller that houses a direct access diskette drive with a 1-sided removable diskette.

**Prerequisites:** One 3663 Supermarket Terminal mdl 2 must be locally attached.

A properly equipped S/370, 30XX or 4300 processor must be available. The S/370, 30XX or 4300 processor must contain a virtual storage processor. For minimum configuration requirements, refer to S/370, 30XX or 4300 System Programming pages. In addition, either a 3704 or 3705 must be used or an ICA on a S/370 mdl 115, 125, 135, 135-3 or 138, or a Communications Adapter (#1601) feature on the 4331. 1200 bps external modems may be used with 3704, 3705, and ICA on S/370 mdl 115, 125, 135, 135-3 or 138, or a Communications Adapter (#1601) feature on the 4331. 1200 bps internal modems may be used with 3704, 3705, and ICA on S/370 mdl 115 or 125, or a Communications Adapter (#1601) feature on the 4331. For required features, see M2700 pages.

Communication Feature - one of the following arrangements must be used:

- (1) Communications Feature With Clocking (#1482), Interface (#3701), and an external modem operating at 1200 bps, or
- (2) Communications Feature With Clocking (#1482), 1200 bps Integrated Modem-Switched (#5501), and FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.

IBM has not tested the 3660 Supermarket Key-Entry System on non-virtual IBM Systems. If a customer elects to establish communications with other than a virtual host system, he must understand that IBM does not assume responsibility for the resolution of any programming problems resulting from this system configuration.

**HIGHLIGHTS**

Up to 12 3663 Supermarket Terminals may be included in a 3660 Supermarket Key Entry System. One 3663 mdl 2 must be attached to the 3661 via local attachment, (standard) and a second 3663 mdl 2 may be attached to the 3661 via the optional 3663 mdl 2 Local Attachment Feature. All other 3663 Terminal Stations in the system, up to 11, depending locally upon the number of locally attached stations, are attached via a store loop.

The 3661 with the 3663 Supermarket Terminals provides the following functions:

**Customer Checkout:**

- Automatic pricing through code look-up in a master price file for up to 250 items standard and up to 1,275 items with Add'l Storage (#1222).
- Automatic handling of multiple priced items in master file.
- Automatic handling of mix and match group pricing for items in the master price file.
- Automatic distribution of net sales by department.
- Automatic application of transaction discounts.
- Automatic computation of sales taxes, if applicable, with automatic handling of taxable and non-taxable items.
- Check verification facilities (negative with reason code) through look-up against a check verification record.
- Computation of change due.

All functions can be controlled to inhibit initiation by unauthorized personnel.

**Store Support:** Preparation of the following accounting reports:

- Store Summary
- Individual cashier performance and tender reconciliation
- Store office tender reconciliation
- Sales by department (up to 9)
- Distribution of miscellaneous income and disbursements by account.
- Current inquiries for department sales, cashier performance and cash position, and store cash positions.
- Maintenance of master price file, check verification file, and operator authorization file.
- Productivity totals for each terminal station and store totals in 60 minute increments.
- Setting time and date for the internal clock.
- Customer checkout training mode.
- Printing miscellaneous messages received previously from the host.
- Entry of miscellaneous messages for subsequent retrieval by the host.
- Reporting of items returned by customers which are returned to stock.
- Updating the system with data received from the host.
- Shelf Label Preparation.

Most store support functions may be performed concurrently with customer checkout. All functions are individually controlled to inhibit initiation by unauthorized personnel.

**Data Accumulation:** The 3661 accumulates the following by-product data for subsequent retrieval by the host: Item movement totals, all accounting and performance totals used in store reports, totals of taxes and taxable sales, if applicable, productivity totals for each terminal station in increments of sixty minutes, exception events, and security sensitive events.

**Host S/370, 30XX or 4300 Processor Transmission:** The 3661 can transmit to the host, upon receiving a request, all of the data shown under "Data Accumulation" and other data or records in the 3661. The 3661 will clear out data or records upon request of the host. The 3661 can receive records, record changes, commands or other pertinent data from the host. See "Programming Support" section for description of host, programming support, and requirements. Host communication cannot be performed concurrently with customer checkout or store support procedures.

**Communication Facilities:** For in-store operation, a store loop provides the communication link to the 3663 Supermarket Terminals. See *Installation Manual-Physical Planning*, GA27-3079, for further information.

The Communications Adapter permits operation at the speeds indicated over the facilities shown below when using the appropriate modem. For information concerning the facilities, see M2700 pages.

**SPECIFY**

- Power (AC, 1-phase):
 

<b>50 Hz</b> 110V #2805 123.5V #2811 220V #2813 235V #2814	<b>60 Hz</b> 115V #9901
------------------------------------------------------------------------	----------------------------
- Communications:
  - Binary Synchronous Communication #9075
  - Synchronous Data Link Control #9076
- Modem Cable (external modem): A 10-foot cable to the modem is standard. If a longer cable is required, specify #9442, indicating length as a quantity of 20, 30, 40, or 50 feet.
- Store Loop Polarity Tester: Order Store Loop Polarity Tester, P/N 1859559, from plant of manufacture. One is furnished at no charge to each 3660 site for testing Store Loop wiring.

**Note:** Tester matches receptacle P/N 5162880 which can be ordered on MES or PSR from Raleigh.

**3661 Store Controller (cont'd)**

- Machine Nomenclature (specify one):

Canadian English #2934	German #2929
Canadian French #2935	Italian #2932
English US #2750	Spanish #2931
French #2928	

**SPECIAL FEATURES**

**Add'l Storage (#1222):** Provides an additional 8,192 bytes of storage to increase the number of item records from a minimum of 250 to a maximum of 1,275. **Maximum:** One. **Field Installation:** Yes.

**Communications With Clocking (#1482):** Required for attachment to communication facilities through the 1200 bps Integrated Modem (#5501) or any external modem which does not have internal clocking. Also required for CCITT Interface (#3701). **Maximum:** One. **Field Installation:** Yes.

**CCITT Interface (#3701):** Provides the appropriate cables and interface logic necessary to attach the following:

- Datel Switched Service Plan 32 - Australia
- Datel 600 Switched Service - New Zealand

**Limitations:** Cannot be installed with 1200 bps Integrated Modem, Switched (#5501). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1482.

**1200 bps Integrated Modem, Switched (#5501):** Provides the point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. **Limitations:** Cannot be installed with Interface (#3701). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1482. The user must provide FCC-registered protective circuitry of the CBS type (or equivalent).

**Scale Adapter (#6672):** Allows attachment of an electronic scale that meets the interface requirements in *Scales Interface to the IBM 3663 Supermarket Terminal* document which is available from Corporate Industry Relations for use with locally attached 3663 mdl 2. **Maximum:** Two. **Field Installation:** Yes. **Specify:** #9576 if scale will be used with first 3663 mdl 2, or #9577 if it will be used with second 3663 mdl 2.

**3663 Mdl 2 Local Attachment (#8110):** Provides for the local attachment of a second 3663 mdl 2. **Maximum:** One. **Field Installation:** Yes. **Note:** The first 3663 mdl 2 attachment is provided in the basic 3661.

**ACCESSORIES**

**Cables (P/N 5165886):** Bulk Indoor Loop Cable to attach 3660 units may be purchased from IBM or a customer-selected source. See *Physical Planning Manual*, GA27-3074, for bulk loop specifications. The customer is responsible for installation and maintenance of these cables. The bulk loop cable may be purchased from IBM.

**Cables (P/N 7838695):** Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable -- UL-approved for duct and plenum installation (NEC Art. 725-2b) ... maximum allowable cable temperature range is -34 C to +105 C. This bulk indoor loop cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). Allow a lead time of 120 days. **Warranty:** Loop Cable is warranted free from defects of workmanship and materials for 90 days.

**SUPPLIES**

Contact IBM.

## 3663 SUPERMARKET TERMINAL

### PURPOSE

In conjunction with the 3651 mdl B25, (Canada only) C25, +IA60, B60, A75, B75, C75, D75 Store Controller or the 3661 Store Controller, the 3663 Supermarket Terminal provides the input and output facilities necessary to process transactions in a supermarket environment. It replaces and extends the function of mechanical supermarket registers.

### MODELS

**Model 1** 001 Station and Control -- One printer, display, keyboard, cash drawer and control segment for operating one checkstand.

**Model 1P** P01 [NO LONGER AVAILABLE] Station and Control -- One printer, display, keyboard, cash drawer and customer programmable control segment for operating one checkstand.

**Model 2** 002 Station Only -- One printer, display, keyboard, and cash drawer that attaches to a 3663 model 1, 1P or 3P or the 3661 Store Controller, for operating additional checkstands. One 3663 model 2 must be attached to the 3661, a second and a third 3663 model 2 may be attached via #8110 and #8111 respectively (#8110 is a prerequisite for #8111.)

**Model 3P** P03 [NO LONGER AVAILABLE] Control Segment Only -- A customer programmable control segment for controlling one or optionally up to three, 3663 model 2s. Note: The first 3663 model 2 attachment is provided in the basic 3663 model 3P.

**Limitations:** The mdl 1 is not available in conjunction with the 3651 Store Controller mdl B25, A75, B75, C75, or D75.

The mdl 1P is not available in conjunction with the 3651 Store Controller mdl A60 or B60 - Supermarket or with the 3661 Store Controller.

The mdl 3P is not available in conjunction with the 3651 Store Controller mdl A60 or B60 - Supermarket or with the 3661 Store Controller.

**Prerequisites:** One 3663 mdl 2 must be attached to the 3663 mdl 3P.

With 3651 Store Controller mdl B25, (Canada only) C25, A75, B75, C75 or D75: (1) An available store loop position ... (2) For attachment of a 3663 mdl 2 to the store loop, a 3663 mdl 1P with a Mdl 2 Attachment Feature is a prerequisite unless the 3663 mdl 2 is attached to a 3663 mdl 3P. For attachment of a 3663 mdl 2 to a 3663 mdl 3P, a Mdl 2 Attachment Feature (#4900) is a prerequisite if it is the second 3663 mdl 2 attached to the 3663 mdl 3P. A 3rd Mdl 2 Attachment Feature (#4901) is a prerequisite if it is the third 3663 mdl 2 attached to the 3663 mdl 3P. Note: The first 3663 mdl 2 attachment is provided in the basic 3663 mdl 3P.

With 3651 Store Controller mdl A60 or B60: (1) A 3669 Store Communications Unit and an available store loop position ... (2) A 3663 mdl 1 with a Mdl 2 Attachment (#4900) feature is prerequisite for each 3663 mdl 2 to be added to a store loop.

With 3661 Store Controller: (1) An available local attachment on the 3661 or a store loop position. Note: One 3663 mdl 2 must be attached to the 3661 via the standard local attachment. One or two additional 3663 mdl 2s can be locally attached via optional Local Attachment Features ... (2) For attachment of a 3663 mdl 2 to the store loop a 3663 mdl 1 with a Mdl 2 Attachment Feature is a prerequisite, unless the 3663 mdl 2 is attached to a 3663 mdl 3. For attachment of a 3663 mdl 2 to a 3663 mdl 3, a Mdl 2 Attachment Feature (#4900) is a prerequisite if it is the second 3663 mdl 2 attached to the 3663 mdl 3. A 3rd Mdl 2 Attachment Feature (#4901) is a prerequisite if it is the third 3663 mdl 2 attached to the 3663 mdl 3. Note: The first 3663 mdl 2 attachment is provided in the basic 3663 mdl 3.

### HIGHLIGHTS

Has a storage area for each station into which keyed (or scanned if a 3667 Checkout Scanner is attached) data is entered prior to being transmitted to the 3651 Store Controller mdl B25, (Canada only) C25, A60, B60, A75, B75, C75 or D75 or the 3661 Store Controller. Checks for code accuracy, sequence control, field length, and correct number of fields. Another storage area at each station is used for receiving a previously entered message after being processed at the 3651 mdl B25, (Canada only) C25, A60, B60, A75, B75, C75 or D75 or the 3661. Upon

receiving messages, data is edited and transferred to the printer and display.

With the appropriate special adapter features, the 3663 can attach non-IBM coin and trading stamp dispensers, non-IBM front end scales, and 3667 Checkout Scanners. In addition, a Document Insert feature can be added to the printer to allow "franking" (printing special data) on checks.

**Keyboard:** Has a ten-key numeric pad plus function keys. In part these include department keys, special item modification keys (for price, quantity and weight entries), tender payment keys, coupon entry keys, and other related supermarket required keys. (See the *IBM 3660 Supermarket System Introduction Manual*, GA27-3076, or the *IBM 3650 Programmable Store System Introduction Manual*, GA27-3163, for details).

**Printer:** Has two tape print locations as standard. Using a horizontal radial printing technique, the first tape printed is the customer receipt. The second tape is for summary journal data. An optional Document Insert feature position may be added. Alphameric printing is accomplished with a dot matrix print head. Printing in each position is up to 30 characters. Customer receipt tape printing is at 80 lines per minute. Summary journal tape printing is at 50 lines per minute. Document Insert printing is at 35 lines per minute. Shelf labels can be printed at 3-4 labels per minute, depending upon the size of the label.

**Cash Drawer:** Has a removable and lockable till with five spring-weighted bill compartments and five coin compartments. The bill compartments are adjustable to accommodate varying bill sizes existing in different countries.

A 3-position lock controls power to the station and manually opens the drawer regardless of power status. The key is removable in any position. No terminal function can be initiated with the drawer open.

**Display:** A variable character display panel allows displaying an alphameric message of up to 22 characters in length. Characters are 0.4 inches high and variable in width.

**Communications:** Provided over two 2-wire customer-provided loops called store loops. Messages from the 3651 mdl B25, (Canada only) C25, A60, B60, A75, B75, C75 or D75 or the 3661 are monitored by the 3663 Supermarket Terminal for terminal destination. A pluggable address scheme is provided for terminal numbering. See the *Installation Manual - Physical Planning*, GA27-3079, for the 3660 Supermarket System and *Installation Manual - Physical Planning*, GA27-3167, for the 3650 Programmable Store System.

**Packaging:** Stations can be specified fully integrated (all I/O segments under a single cover) or integrated with a remote display. An optional special feature with a specify code will provide a distributed station (I/O segments separately covered to allow location flexibility).

### Customer Responsibilities:

1. See M2700 pages for customer responsibilities concerning communications facilities.
2. Customer is responsible for obtaining, installing, and testing the necessary store loops, including the set of connectors required for each terminal and Store Loop junction box. See the *Installation Manual-Physical Planning* for the 3650 Supermarket System. Also see "Proposal Considerations" in the General Information section for use of a Polarity Tester.
3. In cooperation with the marketing representative, and the CE Installation Planning Representative, order the required system cables from IBM.
4. The customer is responsible for laying and/or routing all 3663 cables (supplied by IBM or by non-IBM supplier for attached devices) and providing suitable protection for these cables. IBM-supplied cables will be shipped 30 days prior to shipment of IBM components to provide sufficient time for installation of these cables. See the *Installation Manual-Physical System* for the 3660 Supermarket System for further details.
5. The customer is responsible for providing a facility to support all station segments, distributed or integrated. One integrated station may be located on the control segment if desired.
6. The customer is responsible for obtaining and maintaining the additional features required to complete a checkout environment beyond those elements supplied by IBM.
7. The customer is responsible for ensuring that scales attached to the system comply with weights and measures regulations.

**3663 Supermarket Terminal (cont'd)**

8. If a customer wishes to rearrange keytops on the 3663, a device is available to aid him or he may have IBM service do this on a "Time and Material" basis. A device is automatically supplied with every Store Controller.

**Proposal/Acknowledgement Letter Statements:** Each Proposal and Acknowledgement Letter must include the following statement: "It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3663 which contains cash or other valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations."

When a failure occurs in the cash drawer of any 3663 and it cannot be opened prior to maintenance by IBM, the Customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

**Maintenance:** Agreement for IBM to install and maintain the 3663 must be reviewed by CE country management prior to making any commitment to the customer.

**SPECIFY**

- Power (AC, 1-phase): Specify one.

50 Hz	60 Hz (Not available on 3663-3P)
110V #2805	115V #9901
123.5V #2811	208V #9902
220V #2813	230V #9904
235V #2814	

- Packaging: Specify #9547 for fully integrated, #9549 for integrated but with remote display. Specify #9548 for distributed; special feature #3425 (Distributed Station) is a prerequisite. Specify one specify code for each 3663 mdl 1 or mdl 1P and one for each 3663 mdl 2; if #9548, feature code #3425 for each 3663 mdl 1, 1P and mdl 2 also. Specify codes need not be the same for all 3663s in a store. Changes in packaging of installed terminals are not permitted in the field.
- Cabling: See cable order form Z120-2516 and refer to *Installation Manual - Physical Planning*, GA27-3079, for the 3660 Supermarket System and *Installation Manual - Physical Planning*, GA27-3167, for the 3650 Programmable Store System.
- Keypad Arrangement: Specify #9353 for a reversed keypad (top row -- 7, 8, 9; middle row -- 4, 5, 6; bottom row -- 1, 2, 3). **Limitations:** In the 3660 Supermarket Scanning and Key Entry Systems, if installed on one 3663 mdl 1 or 2, it must be installed on all 3663 mdl 1s and 2s in the store. Do not specify if Optional Keyboard (specify code #9488) is ordered. Delete this specify on existing orders pending, if Optional Keyboard (specify code #9488) is to be added. In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments -- paired mdl 1P and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended.
- Cash Drawer Locks: A separate group of 25 lock numbers has been set aside to allow a customer to use the same key in multiple terminals. If this is desired, specify one of the following locks on the 3663 order:

#9101	#9106	#9111	#9116	#9121
#9102	#9107	#9112	#9117	#9122
#9103	#9108	#9113	#9118	#9123
#9104	#9109	#9114	#9119	#9124
#9105	#9110	#9115	#9120	#9125

If this option is not specified, a lock will be randomly selected from another, larger, group of unique lock numbers.

- Machine Nomenclature (specify one):

Canadian English #2934	French #2928
Canadian French #2935	German #2929
English UK #2927	Italian #2932
English US #2750	Spanish #2931

Note: All 3651 mdl B25, (Canada only) C25, A60, B60, A75, B75, C75 or D75 Store Controllers shipped to countries contain the required graphics for output on 3663s for the following countries:

France	Spanish Speaking
Germany	UK

The graphics not applicable will be selected by the host by means of options and need not be specified here.

- Keyboard Type: One keyboard type must be specified for each 3663 mdl 1, 1P and 2. Specify code #9020 will provide the Regular Keyboard with the 10-key pad positioned on the left. This keyboard may have up to nine department keys. **Limitations:** In the 3660 Supermarket Scanning and Key Entry System, if installed on more than one 3663 in the local or back-up store, all key assignments must be the same. Not compatible with Optional Keyboard (#9488). In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments -- paired mdl 1P and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended.

Specify code #9488 will provide the Optional Keyboard with the 10-key pad positioned in the center. The left to right dimension is 16-1/2 inches in the distributed version, special feature code #3425, (no change in the size of the integrated version). An expanded keytop shipping group is included to provide variety in colors, heights and sizes of blank keytops. Also, a means is provided to allow placing single or double sized keys in many locations. **Limitations:** In the 3660 Supermarket Scanning and Key Entry System, this keyboard must be installed on all 3663s in a store and is not compatible with specify code #9020, the Regular Keyboard. All key assignments must be the same. In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments -- paired mdl 1 and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended. **Prerequisites:** In the 3660 Scanning System, special feature #3880 is required on all 3663 mdl 1s in the store if any of the following features are installed in the same store: Coin Dispenser Adapters -- #1821, #1822.

**SPECIAL FEATURES**

**Add'l Department Keys (#1059):** [Mdl 1, 1P, 2] Provides six additional department keys and a set of 25 prelabeled keytops. **Limitations:** In the 3660 Supermarket Scanning and Key Entry Systems, if installed on more than one 3663 in the store or backup store, the key assignments for all of the additional keys must be the same. In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments -- paired mdl 1P and 2 terminals must have the same type of keyboard and the same key assignments.

**Storage Expansion Feature (#1580):** [Mdl 1P, 3P] Provides the capability of installing storage increments 4 through 9. **Limitations:** This feature now applies only to mdls 1P and 3P that were scheduled for shipment prior to August 1, 1980 and lower than EC level 320637. **Maximum:** One. **Field Installation:** Yes.

**Checkout Scanner Adapter Type 2 (#1763):** [Mdl 1, 1P] Allows attachment of a 3667 checkout Scanner for operation with the 3663 mdl 1 or 1P to which it is attached. **Limitations:** Cannot be installed when 3663 is attached to the 3661 Store Controller. Cannot be installed when #1761 is installed. **Maximum:** One. **Field Installation:** Yes. Note: For countries that have EAN scan label requirements, see RPQ 7S0250 (EAN/UPC Scanner Adapter) for ordering instructions, prerequisites, and limitations.

**2nd Checkout Scanner Adapter Type 2 (#1764):** [Mdl 1, 1P] Allows attachment of a 3667 Checkout Scanner for operation with an attached 3663 mdl 2. **Limitations:** Cannot be installed when 3663 is attached to the 3661 Store Controller. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1763, #4900 and the 3663 mdl 2.

**Coin Dispenser Adapter Type 2 (#1821):** [Mdl 1, 1P, 3P] Allows attachment of an 8-column Coin Dispenser (that meets the interface requirements in "Non-IBM Coin Dispenser Attachment Interfaces to the IBM 3663 Supermarket Terminal" document available from Corporate Industry Relations) to any one station of a 3663 mdl 1, 1P or 3P. **Maximum:** One. **Limitation:** Not available if Coin Dispenser Type 1 (#1811) (no longer available) is installed. **Field Installation:** Yes.

**2nd Coin Dispenser Adapter Type 2 (#1822):** [Mdl 1, 1P, 3P] Allows attachment of a second 8-column Coin Dispenser (that meets the interface requirements in "Non-IBM Coin Dispenser Attachment

### 3663 Supermarket Terminal (cont'd)

Interfaces to the IBM 3663 Supermarket Terminal" document available from Corporate Industry Relations). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1821.

**3rd Coin Dispenser Adapter Type 2 (#1823):** [Mdl 3P] Allows attachment of a third 8-column coin dispenser (that meets the interface requirements in "Non-IBM Coin Dispenser Attachment Interfaces to the IBM 3663 Supermarket Terminal" document available from Corporate Industry Relations). **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #1821, #1822 and a third mdl 2 attachment (#4901).

**Document Insert (#3451):** [Mdl 1, 1P, 2] Provides a third location on the printer for printing on an inserted form (refer to 3660 Supermarket Systems Introduction, GA27-3076, for details on forms). **Limitations:** In the 3660 Supermarket Scanning and Key Entry Systems, if this feature is desired for a mdl 1 on the store loop, it must be installed on the attached mdl 2 (if any) or vice versa. **Maximum:** One on each 3663 mdl 1, 1P or 2. **Field Installation:** Not recommended.

**Storage Increment (#3880):** [Mdl 1, 1P, 3P] Provides 2,048 additional positions of storage. All replaced parts become the property of IBM. **Limitations:** If this feature is required on one 3663 mdl 1, it must be installed on all 3663 mdl 1s in the store. This feature is only allowed on mdl 1 and on mdl 1P and 3P scheduled for shipment prior to August 1, 1980 and lower than EC level 320637. **Maximum:** One on 3663 mdl 1, nine on mdl 1P and 3P. **Field Installation:** Yes. **Prerequisites:** Installation of more than 3 Storage Increments (mdl 1P and 3P only) requires one Storage Expansion Feature (#1580).

**Storage Increment (#4225):** [Mdl 1, 1P, 3P] Provides 8,176 bytes of additional storage. **Limitations:** Not compatible with feature #3880 or #1580. This feature is to be used on all mdl 1P and 3P scheduled for shipment subsequent to August 1, 1980 and at EC level 320637 or higher. For mdl 1P and 3P shipped prior to August 1, 1980 an "as required" EC is necessary to allow installation of this feature. **Maximum:** Three. **Field Installation:** Yes.

**IML-Read Adapter (#4634):** [Mdl 1P, 3P] Provides a means to initialize 3663 terminals when a 3651 Store Controller mdl A25, B25, (Canada only) C25, A75, B75, C75 or D75 is unavailable or unable to provide the IML (Initial Machine Load). An adapter is provided for attaching an external tape cassette recorder (refer to IBM 3650 Retail Store System Introduction Manual, GA27-3075), and reading data previously recorded at a 3651 equipped with the IML-Write Adapter (#4633). **Maximum:** One. **Field Installation:** Yes.

**Mdl 2 Attachment (#4900):** [Mdl 1, 1P, 3P] Allows attachment of one 3663 mdl 2 to a 3663 mdl 1 or 1P, or allows attachment of a second 3663 mdl 2 to a 3663 mdl 3P. **Maximum:** One. **Field Installation:** Yes. **Note:** The basic 3663 mdl 3P provides for attachment of the first 3663 mdl 2 as a standard feature.

**3rd Mdl 2 Attachment (#4901):** [Mdl 3P] Allows attachment of the third 3663 mdl 2 to a 3663 mdl 3P. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #4900 on 3663 mdl 3P.

**Optional Keyboard (#5470):** [Mdl 1, 1P, 2] Provides a new keyboard option. The left to right dimension is 16-1/2 inches in the distributed version. (No change in the size of the integrated version). Department keys are placed in a horseshoe fashion around a centrally located numeric keypad. An expanded keytop shipping group is included to provide variety in names, colors, heights and sizes of keytops. Also, a means is provided to allow placing single or double sized keys in many locations. **Limitations:** In the 3660 Supermarket Scanning and Key Entry Systems, this feature must be installed on all 3663s at a location if the feature is desired on any unit at that location. It is not compatible with the Add'l Department Keys (#1059) feature and a basic keyboard. In the 3650 Programmable Store System, all 3663 mdl 2 terminals attached to the same 3663 mdl 3P must have the same type of keyboard and the same key assignments -- paired mdl 1P and 2 terminals must have the same type of keyboard and the same key assignments. **Field Installation:** Not recommended. **Prerequisites:** In the Scanning System, Expanded Capability (#3880) is required on all 3663 Mdl 1s in the store if any of the following features are installed in the same store: Coin Dispenser Adapters (#1821 or #1822).

**Receipt Station Half Space (#6226):** [Mdl 1, 1P, 2] Vertical spacing in the receipt station is modified to provide half normal vertical spacing, i.e., 10 vertical spaces per inch. The spacing may be manually switched to normal (5 lines per inch). This feature also detects end of label and start of label as well as "End of Forms". Depending on label size, approximately 3-4 labels per minute can be printed. **Limitations:** Only one printer per Control Segment can be used when printing shelf

labels. 3663s attached locally to the 3661 cannot install this feature. **Maximum:** One. **Field Installation:** Yes.

**Scale Adapter (#6671):** [Mdl 1, 1P, 3P] Allows attachment of an electronic scale (that meets the interface requirements in "Non-IBM Scales Interface to the IBM 3663 Supermarket Terminal" document available from Corporate Industry Relations). **Maximum:** Two on mdl 1 or 1P; three on mdl 3P. **Field Installation:** Yes. **Note:** See Customer Responsibilities **Prerequisites:** For mdl 1P and 3P, the 3650 Programmable Store System Point of Sale Application/Supermarket Environment Program Product (5748-D21) is a mandatory requirement in all states conforming to the National Bureau of Standards Handbook #44 for Weights and Measures. **Prerequisites:** For mdl 1P and 3P, the 3650 Programmable Store System Point of Sale Application/Supermarket Environment Program Product (5748-D21) is a mandatory requirement for certain countries. **Specify:** #9561 if Scale will be used for the station portion of a 3663 mdl 1 or 1P or for the first 3663 mdl 2 attached to a 3663 mdl 3P, or #9562 if it will be used for a 3663 mdl 2 attached to a 3663 mdl 1 or 1P, or for the second 3663 mdl 2 attached to a 3663 mdl 3P, or #9563 if it will be used for the third 3663 mdl 2 attached to a 3663 mdl 3P.

**Stand-alone Initial Machine Load (#7555):** [Mdl 1, 3] Allows a user-provided tape cassette to be attached to a 3663 Supermarket Terminal mdl 1 to provide IML capability if required when the 3663 is operating in standalone mode. **Maximum:** One.

### MODEL CONVERSIONS

Not recommended for field installation except from model 1 to 1P. All replaced parts become the property of IBM.

### ACCESSORIES

**Keyboard Accessories:** The following terms are used in the KEYTOP descriptions:

Version	Stem Number/Key Alignment
OV	One/Vertical
OH	One/Horizontal
OVH	One/Vertical or Horizontal
TV	Two/Vertical
TH	Two/Horizontal
-B	Small raised projection in keytop
-C	Circular, concave top on key button
-M	Minimal concavity of circular keytop
Size	Units
Square	1 x 1
Single	1 x 1-1/3
Long	1 x 2
Double	1-1/3 x 2

**Engraved Keytops:** Keytops containing pre-defined messages are available for use on the 3663 terminal keyboards. Blank keytops are also available for customer engraving. Keytops can be ordered by P/N Specify P/N and quantity.

The following is a list of pre-defined keytops available in the 3660 Supermarket System nomenclature:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
<b>Canadian French:</b>					
/	White	Square	OH-CMStd		5192956
OUVERT PERM	Blue	Single	OH	Std	1641016
DIVERS H	Blue	Single	OH	Std	1641020
VERIF CHEQUE 1	Blue	Single	OH	Std	1641065
CHEQUE F	Blue	Single	OH	Std	1641069
QTE C	Blue	Single	OH	Std	1641083
QTE C	Blue	Single	OH	R 1/8	1650278
POIDS A NUM	Blue	Single	OH	R 1/8	1650279
PRIX BPASSE	Blue	Single	OH	R 1/8	1650281
BOUCA	Red	Single	OH	Std	1650284
BON RED PRODUCT N	Red	Single	OH	Std	1650314
ANNUL J	Red	Single	OH	Std	1650315
REMB D	Red	Single	OH	Std	1641316
REMISE K	Red	Single	OH	Std	1650317
NON VENTE +	White	Single	OH	Std	1650319
TABAC	Brown	Single	OH	R 1/8	1650360
NON-ALIM	Brown	Single	OH	R 1/8	1650400
CONSIGNE	Blue	Single	OH	R 1/8	1650447
REMB CONSIGNE	Red	Single	OH	R 1/8	1650448
EIPCERIE TAXEE	White	Single	OH	R 1/8	1650449
EIPCERIE SS TAXE	White	Single	OH	R 1/8	1650450

**3663 Supermarket Terminal (cont'd)**

TARE	Blue	Single	OH	Std	1855267
MODIF ENTREE	Blue	Single	OH	Std	5183520
PROD LAIT	White	Single	OH	R 1/8	5192934
PROD CONG	Blue	Single	OH	Std	5192935
CIDRE	Brown	Single	OH	R 1/8	5192936
SANTE	White	Single	OH	R 1/8	5192937
MARCH GEN	Green	Single	OH	R 1/8	5192938
PLANTES	Green	Single	OH	R 1/8	5192939
MENUS	Brown	Single	OH	R 1/8	5192940
FROMAGE	Yellow	Single	OH	R 1/8	5192941
BIERE	Yellow	Single	OH	R 1/8	5192943
FRUIT LEG	Green	Single	OH	R 1/8	5192944
ARGENT	Blue	Single	OH	Std	5192945
BON	Blue	Single	OH	Std	5192946
TIMBRE	Blue	Single	OH	Std	5192947
FRAIS CHEQUE	Blue	Single	OH	R 1/8	5192948
TAXE/SS TAXE	Blue	Single	OH	Std	5192949
CERTIF CADEAU	Red	Single	OH	Std	5192951
BOUL	White	Single	OH	R 1/8	5192952
POISSON	White	Single	OH	R 1/8	5192953
CHARC	Yellow	Single	OH	R 1/8	5192955
ENTREE	White	Double	TV	R 1/8	1650337
EPIC	White	Double	TV	R 1/8	1650339
EFFAC	White	Double	TV	R 1/8	5192954
<b>NAME</b>	<b>COLOR</b>	<b>SIZE</b>	<b>VERSION</b>	<b>HEIGHT</b>	<b>P/N</b>
<b>France:</b>					
REMISE K	Blue	Single	OH	Std	1641001
NON VENTE	Blue	Single	OH	Std	1641014
EXCEPT	Blue	Single	OH	Std	1641015
OUVERT PERM	Blue	Single	OH	Std	1641016
BON RED PRODUCT N	Blue	Single	OH	Std	1641017
ANNUL J	Blue	Single	OH	Std	1641019
DIVERS H	Blue	Single	OH	Std	1641020
ESPECES G	Blue	Single	OH	Std	1641021
REMB	Blue	Single	OH	Std	1641023
E	Blue	Single	OH	Std	1641026
PROD FRAIS	Green	Single	OV	Std	1641050
BOUCH	Red	Single	OV	Std	1641051
EPIC	Blue	Single	OV	Std	1641057
VERIF CHEQUE 1	Blue	Single	OH	Std	1641065
CHEQUE F	Blue	Single	OH	Std	1641069
QTE C	Blue	Single	OH	Std	1641083
RAYON 1	Blue	Single	OV	Std	1645064
RAYON 2	Blue	Single	OV	Std	1645065
RAYON 3	Blue	Single	OV	Std	1645066
RAYON 4	Blue	Single	OV	Std	1645067
RAYON 5	Blue	Single	OV	Std	1645068
RAYON 6	Blue	Single	OV	Std	1645069
QTE C	Blue	Single	OH	R 1/8	1650278
POIDS A NUM	Blue	Single	OH	R 1/8	1650279
PRIX BPASSE	Blue	Single	OH	R 1/8	1650281
FOOD PRAIS	Green	Single	OH	R 1/8	1650283
BOUCH	Red	Single	OH	R 1/8	1650284
M	Red	Single	OH	Std	1650305
BON RED PRODUCT N	Red	Single	OH	Std	1650314
ANNUL J	Red	Single	OH	Std	1650315
REMB D	Red	Single	OH	Std	1650316
REMISE K	Red	Single	OH	Std	1650317
NON VENTE +	White	Single	OH	Std	1650319
RAYON 2	White	Single	OH	R 1/8	1650370
ENTREE	White	Single	OV	Std	1650371
ENTREE	White	Single	OH	R 1/8	1650372
EPIC	White	Single	OH	R 1/8	1650373
RAYON 3	Yellow	Single	OH	R 1/8	1650374
RAYON 4	Green	Single	OH	R 1/8	1650375
RAYON 3	Red	Single	OH	R 1/8	1650376
CONSIGNE	Blue	Single	OH	R 1/8	1650447
REMB CONSIGNE	Red	Single	OH	R 1/8	1650448
EPICERIE TAXEE	White	Single	OH	R 1/8	1650449
EPICERIE SS TAXE	White	Single	OH	R 1/8	1650450
TARE	Blue	Single	OH	R 1/8	1762477
POIDS A NUM	Blue	Single	OH	Std	1854847
PRIX B PASSE	Blue	Single	OH	Std	1854848
TARE	Blue	Single	OH	Std	1855267
M	Blue	Single	OH	Std	1855424
MODIF ENTREE	Blue	Single	OH	Std	5183520
ENTREE	White	Double	TV	R-1/8	1650337
REST CLAVIER	White	Double	TV	R-1/8	1650338
EPIC	White	Double	TV	R-1/8	1650339
REST CLAVIER	White	Double	OV	Std	1641032
ENTREE	White	Double	OV	Std	1641085

<b>NAME</b>	<b>COLOR</b>	<b>SIZE</b>	<b>VERSION</b>	<b>HEIGHT</b>	<b>P/N</b>
<b>Germany:</b>					
BAR G	Blue	Single	OH	Std	1641024
SCHECK F	Blue	Single	OH	Std	1641025
VERGUT D	Blue	Single	OH	Std	1641027
MENGE C	Blue	Single	OH	Std	1641028
PREIS B (CODE)	Blue	Single	OH	Std	1641029
GEWICHT A (K#)	Blue	Single	OH	Std	1641030
NACHL K	Blue	Single	OH	Std	1641035
STORNO J	Blue	Single	OH	Std	1641036
BEGINN ENDE	Blue	Single	OH	Std	1641038
KEIN VERKAUF	Blue	Single	OH	Std	1641041
RABATT MARKEN	Blue	Single	OH	Std	1641042
DIV ART	Green	Single	OH	Std	1641043
OBST GEM	Blue	Single	OH	Std	1641045
ABT .1	Blue	Single	OV	Std	1644975
ABT .2	Blue	Single	OV	Std	1644976
ABT .3	Blue	Single	OV	Std	1644977
ABT .4	Blue	Single	OV	Std	1644978
BACKM	Blue	Single	OH	Std	1644979
DELIK	Blue	Single	OH	Std	1644980
MILCH PROD.	Blue	Single	OH	Std	1644981
TIEFK KOST	Blue	Single	OH	Std	1644982
SPIRIT	Blue	Single	OH	Std	1644983
WEIN	Blue	Single	OV	Std	1644984
DROG	Blue	Single	OV	Std	1644985
TABAK	Blue	Single	OV	Std	1644986
GE-BUHR	Blue	Single	OV	Std	1644987
FISCH	Blue	Single	OV	Std	1644988
BLU-MEN	Blue	Single	OV	Std	1644989
VER-SCH.	Blue	Single	OV	Std	1644990
KASE	Blue	Single	OV	Std	1644991
BIER	Blue	Single	OV	Std	1644992
MILCH PROD	White	Single	OH	R-1/8	1644554
EIGEN COUPON M	Red	Single	OH	Std	1650276
MENGE C	Blue	Single	OH	R-1/8	1650285
GEWICHT A (K#)	Blue	Single	OH	R-1/8	1650286
AND ZAHLUNG H	Blue	Single	OH	Std	1650287
PREIS B (CODE)	Blue	Single	OH	R-1/8	1650288
SONDER COUPON E	Blue	Single	OH	R-1/8	1650289
SPIRIT	Brown	Single	OH	R-1/8	1650290
DELIK	Yellow	Single	OH	R-1/8	1650291
BACKW	White	Single	OH	R-1/8	1650292
OBST GEM	Green	Single	OH	R-1/8	1650293
WURST FLSC	Red	Single	OH	R-1/8	1650294
TIEFK KOST	Green	Single	OH	R-1/8	1650295
KEIN VERKAUF +	White	Single	OH	Std	1650296
SONDER COUPON E	Blue	Single	OH	Std	1650297
NACHL K	Red	Single	OH	Std	1650298
VERGUT D	Red	Single	OH	Std	1650299
STORNO J	Red	Single	OH	Std	1650300
FREMD COUPON N	Red	Single	OH	Std	1650301
PFAND	Blue	Single	OH	R-1/8	1650329
PFAND-GUTSCHR	Red	Single	OH	R-1/8	1650330
DIV. ART M. ST.	White	Single	OH	R-1/8	1650331
DIV. ART O. ST.	White	Single	OH	R-1/8	1650332
DROG	White	Single	OH	R-1/8	1650377
FISCH	White	Single	OH	R-1/8	1650378
ABT .2	White	Single	OH	R-1/8	1650379
EINGABE	White	Single	OH	Std	1650380
EINGABE	White	Single	OH	R-1/8	1650381
DIV ART	White	Single	OH	R-1/8	1650382
VER-SCH.	Brown	Single	OH	R-1/8	1650383
TABAK	Brown	Single	OH	R-1/8	1650384
BIER	Yellow	Single	OH	R-1/8	1650385
ABT .3	Yellow	Single	OH	R-1/8	1650386
KASE	Yellow	Single	OH	R-1/8	1650387
ABT .4	Green	Single	OH	R-1/8	1650388
BLU-MEN	Green	Single	OH	R-1/8	1650389
ABT .1	Red	Single	OH	R-1/8	1650390
WEIN	Red	Single	OH	R-1/8	1650391
GE-BUHR	Blue	Single	OH	R-1/8	1650392
TARA	Blue	Single	OH	R-1/8	1650409
EIGEN COUPON M	Blue	Single	OH	Std	1752518
WURST FLSC	Red	Single	OV	Std	1854841
KREDIT PRUFUNG 1	Blue	Single	OH	Std	1854843
FREMD COUPON N	Blue	Single	OH	Std	1854846
NON-FOOD	Blue	Single	OV	Std	1855391
TARA	Blue	Single	OH	Std	5183528
EINGABE ANDERN	Blue	Single	OH	Std	5183835
EINGABE	White	Double	TV	Std	1650258



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MACHINES

M 3663.5

Jan 85

Major Revision

## 3663 Supermarket Terminal (cont'd)

SUMME	White	Double	TV	Std	1650282	M	Blue	Single	OH	Std	1855424
SUMME	White	Double	TV	R-1/8	1650340	TARA	Blue	Single	OH	Std	5183528
EINGABE	White	Double	TV	R-1/8	1650341	IMISS ALTERNA	Blue	Single	OH	Std	5183545
LOSCHEN	White	Double	TV	R-1/8	1650342	REGISTR	White	Double	TV	Std	1650268
DIV ART	White	Double	TV	R-1/8	1650343	TOTALE	White	Double	TV	Std	1650270
LOSCHEN	White	Double	OV	Std	1641075	REGISTR	White	Double	TV	R-1/8	1650333
EINGABE	White	Double	OV	Std	1641076	TOTALE	White	Double	TV	R-1/8	1650334
SUMME	White	Double	OV	Std	1752519	AZZER	White	Double	TV	R-1/8	1650335
NAME	COLOR	SIZE	VERSION	HEIGHT	P/N	SCATOL	White	Double	TV	R-1/8	1650336
NAME	COLOR	SIZE	VERSION	HEIGHT	P/N	AZZER	White	Double	OV	Std	1641031
Italy:						TOTALE	White	Double	OV	Std	1641086
BOLLINI -	Blue	Single	OH	Std	1641002	REGISR	White	Double	OV	Std	1641087
INIZIO/FINE CASSA	Blue	Single	OH	Std	1641003	NAME					
BUONI PROD N	Blue	Single	OH	Std	1641004	Spain:					
SCONTO K	Blue	Single	OH	Std	1641006	E	Blue	Single	OH	Std	1641026
ANNULL J	Blue	Single	OH	Std	1641007	CARNE	Red	Single	OV	Std	1641047
VARIE H	Blue	Single	OH	Std	1641008	COMES TIBLES	Blue	Single	OV	Std	1641048
ASSEGNO F	Blue	Single	OH	Std	1641009	REINT D	Blue	Single	OH	Std	1641052
RESO D	Blue	Single	OH	Std	1641011	CANT C	Blue	Single	OH	Std	1641053
QUANT C	Blue	Single	OH	Std	1641012	PESO A (#OP)	Blue	Single	OH	Std	1641055
E	Blue	Single	OH	Std	1641026	DESC K	Blue	Single	OH	Std	1641058
CARNE	Red	Single	OV	Std	1641047	CANC J	Blue	Single	OH	Std	1641059
SCATOL	Blue	Single	OV	Std	1641056	VARIOS H	Blue	Single	OH	Std	1641060
VERIF ASSEGNO 1	Blue	Single	OH	Std	1641073	EFTVO G	Blue	Single	OH	Std	1641061
CONT G	Blue	Single	OH	Std	1641089	IDENT/FIN	Blue	Single	OH	Std	1641062
APRE CASSA +	Blue	Single	OH	Std	1641090	CUPON FAB N	Blue	Single	OH	Std	1641063
ORTO-FRUT	Green	Single	OV	Std	1641092	VERIF CHEQUE 1	Blue	Single	OH	Std	1641065
REP 1	Blue	Single	OV	Std	1644993	SELLO -	Blue	Single	OH	Std	1641066
REP 2	Blue	Single	OV	Std	1644994	NO VENTA +	Blue	Single	OH	Std	1641067
REP 3	Blue	Single	OV	Std	1644995	CHEQUE F	Blue	Single	OH	Std	1641069
REP 4	Blue	Single	OV	Std	1644996	DPT 01	Blue	Single	OV	Std	1645010
PANE	Blue	Single	OV	Std	1644997	DPT 02	Blue	Single	OV	Std	1645011
DOLCI	Blue	Single	OV	Std	1644998	OPT 03	Blue	Single	OV	Std	1645012
LATT.	Blue	Single	OV	Std	1644999	DPT 04	Blue	Single	OV	Std	1645013
CIBI SURG.	Blue	Single	OV	Std	1645000	PAN	Blue	Single	OV	Std	1645014
VINI	Blue	Single	OV	Std	1645001	REPO	Blue	Single	OV	Std	1645015
COSM	Blue	Single	OV	Std	1645002	LACT	Blue	Single	OV	Std	1645016
GEN VARI	Blue	Single	OV	Std	1645003	PROD CONG	Blue	Single	OV	Std	1645017
PESCE	Blue	Single	OV	Std	1645004	LICOR	Blue	Single	OV	Std	1645018
FIORI	Blue	Single	OV	Std	1645005	VINO	Blue	Single	OV	Std	1645019
MINUT.	Blue	Single	OV	Std	1645006	PERF	Blue	Single	OV	Std	1645020
FORM.	Blue	Single	OV	Std	1645007	TABAC	Blue	Single	OV	Std	1645021
NON-ALIM.	Blue	Single	OV	Std	1645008	MERC GEN	Blue	Single	OV	Std	1645022
BIRRA	Blue	Single	OV	Std	1645009	VERIF IMPT	Blue	Single	OV	Std	1645023
CARNE	Red	Single	OH	R-1/8	1650264	PESC	Blue	Single	OV	Std	1645024
QUANT C	Blue	Single	OH	R-1/8	1650266	FLOR	Blue	Single	OV	Std	1645025
PESO A (OPER)	Blue	Single	OH	R-1/8	1650267	VAR	Blue	Single	OV	Std	1645026
PREZZO B (COD)	Blue	Single	OH	R-1/8	1650269	QUESO	Blue	Single	OV	Std	1645027
E	Blue	Single	OH	R-1/8	1650271	NO ALIM	Blue	Single	OV	Std	1645028
DOLCI	Yellow	Single	OH	R-1/8	1650272	CERV	Blue	Single	OV	Std	1645029
PANE	White	Single	OH	R-1/8	1650273	PESO A (#OP)	Blue	Single	OH	R-1/8	1650255
LATT.	White	Single	OH	R-1/8	1650274	PRECIO B CLAVE	Blue	Single	OH	R-1/8	1650257
ORTO-FRUT	Green	Single	OH	R-1/8	1650275	LICOR	Brown	Single	OH	R-1/8	1650259
CIBI SORG.	Green	Single	OH	R-1/8	1650277	REPO	Yellow	Single	OH	R-1/8	1650260
APRE CASSA +	White	Single	OH	Std	1650302	PAN	White	Single	OH	R-1/8	1650261
SCONTO K	Red	Single	OH	Std	1650304	LACT	White	Single	OH	R-1/8	1650262
M	Red	Single	OH	Std	1650305	CARNE	Red	Single	OH	R-1/8	1650264
RESO D	Red	Single	OH	Std	1650306	PROD CONG	Green	Single	OH	R-1/8	1650265
ANNULL J	Red	Single	OH	Std	1650307	E	Blue	Single	OH	R-1/8	1650271
BUONI PROD N	Red	Single	OH	Std	1650308	NO VENTA +	White	Single	OH	Std	1650309
DEPOS. VUOTO	Blue	Single	OH	R-1/8	1650327	DESC K	Red	Single	OH	Std	1650311
RESO DEPOS.	Red	Single	OH	R-1/8	1650328	REINT D	Red	Single	OH	Std	1650312
COSM.	White	Single	OH	R-1/8	1650393	CANC J	Red	Single	OH	Std	1650313
PESCE	White	Single	OH	R-1/8	1650394	CUPON FAB N	Red	Single	OH	Std	1650320
REP 2	White	Single	OH	R-1/8	1650395	PAGO ENVASE	Blue	Single	OH	R-1/8	1650321
REGISTR	White	Single	OH	Std	1650396	DEV ENVASE	Red	Single	OH	R-1/8	1650322
REGISTR	White	Single	OH	R-1/8	1650397	IMPTO COMEST	White	Single	OH	R-1/8	1650323
SCATOL	White	Single	OH	R-1/8	1650398	CEMEST NO IMP	White	Single	OH	R-1/8	1650324
MINUT.	Brown	Single	OH	R-1/8	1650399	PERF	White	Single	OH	R-1/8	1650352
NON-ALIM.	Brown	Single	OH	R-1/8	1650400	PESC	White	Single	OH	R-1/8	1650353
BIRRA	Yellow	Single	OH	R-1/8	1650401	DPT 02	White	Single	OH	R-1/8	1650354
REP 3	Yellow	Single	OH	R-1/8	1650402	INTRO	White	Single	OH	Std	1650355
FORM.	Yellow	Single	OH	R-1/8	1650403	INTRO	White	Single	OH	R-1/8	1650356
GEN. VARI	Green	Single	OH	R-1/8	1650404	COMES TIBLES	White	Single	OH	R-1/8	1650357
REP 4	Green	Single	OH	R-1/8	1650405	VAR	Brown	Single	OH	R-1/8	1650358
FIORI	Green	Single	OH	R-1/8	1650406	NO ALIM	Brown	Single	OH	R-1/8	1650359
REP 1	Red	Single	OH	R-1/8	1650407	TABAC	Brown	Single	OH	R-1/8	1650360
VINI	Red	Single	OH	R-1/8	1650408	CERV	Yellow	Single	OH	R-1/8	1650361
TARA	Blue	Single	OH	R-1/8	1650409	DPTO 3	Yellow	Single	OH	R-1/8	1650362
PESO A (OPER)	Blue	Single	OH	Std	1854838	QUESO	Yellow	Single	OH	R-1/8	1650363
PREZZO B (COD)	Blue	Single	OH	Std	1854839	MERC GEN	Green	Single	OH	R-1/8	1650364
LIQUOR	Blue	Single	OV	Std	1855381						

**3663 Supermarket Terminal (cont'd)**

DPTO 4	Green	Single	OH	R-1/8	1650365
FLOR	Green	Single	OH	R-1/8	1650366
DPTO 1	Red	Single	OH	R-1/8	1650367
VINO	Red	Single	OH	R-1/8	1650368
VERIF IMPT	Blue	Single	OH	R-1/8	1650369
TARA	Blue	Single	OH	R-1/8	1650409
PRECIO B CLAVE	Blue	Single	OH	Std	1854849
M	Blue	Single	OH	Std	1855424
ALTERAR FUNCTION	Blue	Single	OH	Std	5183516
TARA	Blue	Single	OH	Std	5183528
INTRO	White	Double	TV	Std	1650256
INTRO	White	Double	TV	R-1/8	1650344
BORRAR	White	Double	TV	R-1/8	1650345
COMES TIBLES	White	Double	TV	R-1/8	1650346
BORRAR	White	Double	OV	Std	1641033
INTRO	White	Double	OV	Std	1641084

NAME COLOR SIZE VERSION HEIGHT P/N

**United Kingdom:**

1/2	White	Square	OH-CM	Std	1641000
E	Blue	Single	OH	Std	1641026
CHEQUE VERIFY 1	Blue	Single	OH	Std	1641068
CHEQUE F	Blue	Single	OH	Std	1641069
SPIRIT	Blue	Single	OV	Std	1644983
CHEQUE	Blue	Single	OV	Std	1645063
E	Blue	Single	OH	R-1/8	1650271
SPIRIT	Brown	Single	OH	R-1/8	1650290
M	Red	Single	OH	Std	1650305
TAX	White	Single	OH	R-1/8	1650325
NON TAX	White	Single	OH	R-1/8	1650326
CHEQUE	Blue	Single	OH	R-1/8	1650410
ENTER	White	Single	OH	Std	1762467
TARE	Blue	Single	OH	R-1/8	1762477
DEPT 1	Red	Single	OH	R-1/8	1762483
DEPT 4	Green	Single	OH	R-1/8	1762486
ENTER	White	Single	OH	R-1/8	1762500
DEPT 2	White	Single	OH	R-1/8	1762501
M	Blue	Single	OH	Std	1855424
M*	Blue	Single	OH	Std	5995643
O	White	Long	TH	Std	1648416

**Blank Keytops:** The following is a list of blank keytops which are available for customer engraving:

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
(all blank)	White	Square	OH-CMR-1/8		1648413**
	White	Square	OH-CB	Std	1752491**
	White	Square	OH	Std	1853928**
	White	Square	OH-B	Std	1853930**
	White	Square	OH-CM	Std	1854184**
	White	Square	OH-C	Std	1854185**
	White	Single	OVH	Std	1762468**
	Yellow	Single	OVH	Std	1762469**
	Black	Single	OVH	Std	1762470**
	Brown	Single	OVH	Std	1762471**
	N-M Br	Single	OVH	Std	2688797**
	White	Single	OH	R-1/8	1762506**
	Red	Single	OH	R-1/8	1762507**
	Blue	Single	OH	R-1/8	1762508**
	Green	Single	OH	R-1/8	1762509**
	Yellow	Single	OH	R-1/8	1762510**
	Black	Single	OH	R-1/8	1762511**
	Brown	Single	OH	R-1/8	1762512**
	White	Single	OH	R-1/4	1762513**
	Red	Single	OH	R-1/4	1762514**
	Blue	Single	OH	R-1/4	1762515**
	Green	Single	OH	R-1/4	1762516**
	Yellow	Single	OH	R-1/4	1762517**
	Black	Single	OH	R-1/4	1762518**
	Brown	Single	OH	R-1/4	1762519**
	Blue	Single	OVH	Std	1853914**
	Green	Single	OVH	Std	1854182**
	Red	Single	OVH	Std	1854183**
	White	Long	TH	R-1/8	1648415**
	White	Long	TH	Std	1648417**
	White	Long	OV	Std	1853909**
	White	Long	OH	Std	1855439**
	Red	Double	TV	R-1/4	1648405**
	Blue	Double	TV	R-1/4	1648406**
	Green	Double	TV	R-1/4	1648407**
	Yellow	Double	TV	R-1/4	1648408**

Black	Double	TV	R-1/4	1648409**
Brown	Double	TV	R-1/4	1648410**
White	Double	TV	Std	1762522**
Red	Double	TV	Std	1762523**
Blue	Double	TV	Std	1762524**
Green	Double	TV	Std	1762525**
Yellow	Double	TV	Std	1762526**
Black	Double	TV	Std	1762527**
Brown	Double	TV	Std	1762528**
White	Double	TV	R-1/8	1762533**
Red	Double	TV	R-1/8	1762534**
Blue	Double	TV	R-1/8	1762535**
Green	Double	TV	R-1/8	1762536**
Yellow	Double	TV	R-1/8	1762537**
Black	Double	TV	R-1/8	1762538**
Brown	Double	TV	R-1/8	1762539**
White	Double	TV	R-1/4	1762540**
N-M Br	Double	TV	Std	2688797**
Blue	Double	OV	Std	1853905**
White	Double	OV	Std	1854181**

**UNIVERSAL KEYTOPS:** Keyboard accessories are available which allow the customer to define and to change the messages on the keytops on the 3663 Supermarket Terminals. These accessories consist of legendable keytops and sheets of blank labels to use on these keytops.

The universal keytops come in four standard sizes and in two heights. They consist of two parts; a white bottom button and a clear plastic cover. Blank labels for the various keytop sizes may also be ordered. These labels come in various colors and may be printed with either black or white ink. The user may define unique key button messages, print these messages on the desired color label, affix the printed color label to the white bottom key button and snap on the clear protective cover. Extra clear plastic covers are also available for use as spares.

Accessories can be ordered by P/N. Specify P/N and quantity.

ITEM	COLOR	SIZE	VERSION	HEIGHT	P/N
Keytop	White	Square	OH	Std	5188767**
Keytop	White	Single	OVH	Std	5188768**
Keytop	White	Single	OH	R-1/8	5188769**
Keytop	White	Long	TH/TV	Std	1642499**
Keytop	White	Long	OV	Std	5188771**
Keytop	White	Long	OH	Std	5188772**
Keytop	White	Double	OV	Std	5188773**
Keytop	White	Double	TV	Std	5188774**
Keytop	White	Double	TV	R-1/8	8627316**
Cover	Clear	Square	--	--	5188751**
Cover	Clear	Single	--	--	5188754**
Cover	Clear	Long	--	--	5188757**
Cover	Clear	Double	--	--	5188760**
ITEM	COLOR	SIZE (DECALS/SHEET)	P/N		
Labels	White	Square (102 decals/sheet)	5194900		
Labels	White	Single (68 decals/sheet)	1756848		
Labels	Yellow	Single (68 decals/sheet)	5194901		
Labels	Red	Single (68 decals/sheet)	5194902		
Labels	Blue	Single (68 decals/sheet)	5194903		
Labels	Green	Single (68 decals/sheet)	5194904		
Labels	Brown	Single (68 decals/sheet)	5194905		
Labels	White	Long (42 decals/sheet)	5194906		
Labels	White	Double (28 decals/sheet)	5194907		
Labels	Red	Double (28 decals/sheet)	5194908		
Labels	Blue	Double (28 decals/sheet)	5194909		

**Key Stops (P/N 1650058):** Specify P/N and quantity.

**Keytop Extractor (P/N 1647720):** The keytop extractor is a small plier-like device that fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on the keytop and it may be pulled off its stem. The customer may find this helpful when adding key stops, universal keytops, or in doing any rearranging of the keyboard. Two keytop extractors are supplied with each 3651 controller. If the customer desires additional extractors, they may be ordered by P/N

**Locks and Keys:** The 3663 Stations are equipped with three locks and a complement of keys as follows:

- Cash Drawer Lock -- different for each station unless specified otherwise. The Cash Drawer Keylock is shipped with two keys as standard.
- Till Cover Lock -- One standard key fits all tills. One key shipped as standard per till.



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MACHINES

M 3663.7  
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Major Revision

### 3663 Supermarket Terminal (cont'd)

- Summary Journal Lock -- One standard key fits all summary journals. One key shipped as standard per summary journal.

Additional or replacement keys may be purchased from IBM or a local locksmith. Cash Drawer Lock Key blank part numbers are listed below if the customer requires key blanks and/or for replacement keys if ordered from IBM. Locks may be changed in the field. A customer authorization letter with key identification number (stamped on key and lock) must accompany the order. If the customer does not specify a specific key number, a new lock with keys will be selected randomly. Allow 6 to 7 weeks for shipment. Note: To order extra keys, specify machine serial number and the key identification number being replaced. Without a key identification number, a new lock must be ordered, with the words "NEW LOCK REQUIRED".

3663 Cash Drawer Key - Specify: Machine serial number, key identification number, machine type, lock serial number, and key P/N from the following chart:

Lock Serial Number	Lock Key P/N
H2601 - H2800	8549431
H2801 - H3000	8549482
H3001 - H3200	6021144
H3201 - H3400	6021145

\*\* 3663 Cash Drawer Keylock with 2 keys (random selection) - P/N 1851086 \*, 3663 Summary Journal Lock (with 2 keys) - P/N 1851371 \*.

\*Specify: Machine serial number and the key identification number being replaced.

**Tills:** The 3663 Supermarket terminal stations are equipped with a removable till and locking cover. Additional tills with locking covers may be ordered. Specify P/N and quantity. See 3663 Till Cover Key under "Locks and Keys".

\*\* 3663 Till P/N 1851138, (Canada only) 3663 Till with Fixed Bill Slots P/N 1851117. -)

### SUPPLIES

**Ribbons:** A black ribbon, P/N 1136970, or equivalent, is recommended; should be used for machines installed prior to June, 1975. Machines installed after this date and those machines previously installed that are changed to the new ribbon drive mechanism should use P/N 1136660 or equivalent. Contact IBM. See 3660 Supermarket System Introduction, GA27-3076, for roll paper and Document Insert forms specifications.

## 3667 CHECKOUT SCANNER

### PURPOSE

Fixed-head optical reader for the 3650 Programmable Store System and the 3660 Supermarket System. The 3667 is 71.1cm (28 inches) high and it is particularly adaptable to:

- Checker unload mode of checkout
- Seated checker operation

### MODELS

**Model 1** 001 Checkout Scanner

### HIGHLIGHTS

When used with the 3650 Programmable Store System, can also read industry standard European Article Numbering (EAN-13) symbols. (When used with the 3650 Programmable Store System, interpretation of all symbols is done by the user application program.)

A fixed head scanner designed to be placed in the checkstand so that greater accuracy and productivity may be achieved. One scanner may be operated with each station; both scanner adapters are located on the 3663 mdl 1/1P.

The scanner contains a laser system which complies with the safety standards proposed by the United States Department of Health, Education and Welfare (Proposed Performance Standard for Laser Products, March 6, 1973 - Class 1, 21 CFR 278) and with ANSI and ACGIH proposed standards.

The scanner reads the new Universal Product Code symbol (Version A & E), announced by the USA Uniform Grocery Product Code Council or the European EAN Universal Product Code via RPQ 7S0250 on the 3663.

Alternate product codes, which may result from national and/or international harmonization efforts, will be addressed by IBM following adoption and publication of the corresponding agreed specifications.

**Prerequisites:** If the 3667 is to operate with a 3663 mdl 1 or 1P, the 3663 mdl 1 or 1P requires Checkout Scanner Adapter Type 2 (#1763).

If the 3667 is to operate with a 3663 mdl 2, the 3663 mdl 1 to which that 3663 mdl 2 is attached requires Checkout Scanner Adapter Type 2 (#1763) and 2nd Checkout Scanner Adapter Type 2 (#1764).

**Customer Responsibilities:** See "Customer Responsibilities" section in M3663 pages.

Refer to *Installation Manual - Physical Planning for the 3660 System* for correct ambient light intensity requirements.

A number of countries presently have adopted, and others are considering the adoption of regulations governing the use of laser products. Users should determine the extent of regulation in their countries. The customer is responsible for providing the remaining checkstand furniture components and their maintenance. Window replacement is a customer responsibility.

The 3667 Scanner must be mechanically restrained in its final mounted position. During maintenance, the 3667 can be tipped forward by a downward force in the extended components drawer. The customer must provide this restraint. Unless the 3667 is restrained from tipping by the geometry of the checkstand, an IBM-provided Safety Clip or Safety Bracket must be ordered for each 3667. It is the responsibility of the customer to locate and install the restraining hardware (see "Specify").

Copies of the UPC Symbol Specifications and the UPC Guidelines are available at a charge from the UPC Council. Write to:

Uniform Product Code Council, Inc.  
7061 Corporate Way, Suite 106  
Dayton, Ohio 45459  
513-435-3870

For copies of the General Specifications for the Article Symbol Marking (EAN) write to:

Secretary General E.A.N.  
Rue Des Colonies 54, Bte 8  
1000 Bruxelles - Belgique

### SPECIFY

- Machine Nomenclature (specify one):

Australian #2918	French #2928
Canadian English #2934	German #2928
Canadian French #2935	Italian #2932
English UK #2927	Spanish #2931

If none of the above is specified, English US will be supplied.

- **Cable Requirements:** See M3663 pages.

- **Packaging/Labels:** Certain countries require special packaging and/or labels to be legally in compliance with the current regulations. Machines installed in these countries must have the appropriate specify code:

Canada\* **#2934 or #2935**

\*Nomenclature Specify Code above provides the additional required items.

- **Scan Direction:** Specify **#9604** for Normal Scan Direction. This is typically used for Over the Counter (OTC) operation, sometimes referred to as checker unload.

**Optional Scan Direction:** Specify **#9605** for optional scan direction. This is typically used for Over the End (OTE) operation, sometimes referred to as customer unload.

See *IBM 3650 Programmable Store System Installation Manual - Physical Planning*, GA27-3167, or *IBM 3600 Supermarket Systems; Installation Manual - Physical Planning*, GA27-3079, for illustration of scan direction options.

- **Item Sensor Position:** Prior to the availability of specify **#9301** and **#9302**, the item sensors were shipped in the low position.

**Specify: #9301** for Item Sensor-High Position. This position may be desired with specify **#9604** (Normal Scan Direction). (Caution: Small flat items may not be sensed in this position causing re-scans or possibly missed items. Contact your Market Support Center for more information.)

**Specify: #9302** for Item Sensor-Low Position. This position may be desired with Specify **#9605** (Optional Scan Direction).

- **Restraining Hardware:** See *3660 System Installation Manual - Physical Planning*, GA27-3079, to determine type of restraining hardware desired. Order one of the following for each 3667 to be installed:

- 1) Safety Clip - for each 3667, order (1) B/M **5194716** to secure one rear 3667 leg to the customers' stationary horizontal mounting surface, or
- 2) Safety Bracket - for each 3667, order (1) B/M **5194758** to secure the 3667 lower rear cabinet extension to the customers' stationary vertical checkstand surface.

Order the Safety Clip or Safety Bracket on MES. This is a no-charge item to the customer and a quantity sufficient for three months' installation may be submitted on a single MES order for a given customer.

### SPECIAL FEATURES (None)

### MODEL CONVERSIONS (None)

### ACCESSORIES

**Window (P/N 5563123):** The 3667 Checkout Scanner is equipped with a replaceable window. With use, it will tend to get scratched and need to be replaced periodically. Window replacement is a customer responsibility. Specify P/N and quantity.

### SUPPLIES

Contact IBM.

## 3669 STORE COMMUNICATION UNIT

### PURPOSE

To provide communications for the 3650 Programmable Store System and the 3660 Supermarket System over PTT-supplied facilities between a 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75 and:

- The host S/370, 30XX or 4300 Processor (3669 mdl 2 only) via a 3872 Modem, 2400 bps Integrated Modem or a PTT mandatory modem attached to a 3704, 3705 or 3725 Communications Controller with switched line features, or a Communications Adapter (#1601) feature on the 4331.
- The store loops at another predesignated store location via another 3669 at that location, to provide backup operation for that store in case its 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75 is inoperative.
- The 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75 in the predesignated store via the 3669 in that store for the purpose of data reconciliation when the backup operation is terminated. If both Store Controllers are 3650 mdl 75, communication can also be performed for purposes other than backup data reconciliation.
- The host 4341, 4361, 4381, 303X or 3090 processor via a 3872 Modem or a PTT mandatory modem attached to a 3720 Communication Controller and operating over switched lines.

In Australia and New Zealand, host communications will be handled at 600/1200 bps on switched lines using the Datel Switched Service Plan 32E or Post Office Datel 600 Switched Service.

The 3669 mdl 3 is designed to provide communications between two predesignated store locations over a nonswitched, 2-wire, half-duplex or 4-wire duplex, point-to-point line. It must be used in countries which do not require mandatory modems over the non-switched telephone network. For countries that require mandatory PTT modems, RPQ 7B0211 must be ordered. It requires a voice-grade telephone line facility of normal quality. For 4800 bps transmission speed, RPQ ZB7983 must be ordered. See your TP Coordinator for local availability of this facility.

### MODELS

#### Model 3 003: Nonswitched Network

Prerequisites: A 3650 Programmable Store System or a 3660 Supermarket System (equipped with a 3651 Store Controller mdl A60, B60, A75, B75, C75 or D75). An appropriate communications facility and attachment arrangement (see M2700 pages). A store loop equipped with at least one 3663 Supermarket Terminal mdl 1 or 1P. Communications with any virtual storage S/370, 30XX or 4300 processor (4331, 4341, 4361, 4381, 3033, 3033MP, 3158MP, 3168, 3168MP VTAM only), (165II BTAM only) or 3081 via the 3704, 3705 or 3725, or an ICA (BTAM only) on a S/370 mdl 115, 125, 135, 135-3 or 138 or a Communications Adapter (#1601) feature on a 4331 or 4361. Communications with any virtual storage 4341, 4361, 4381, 303X, 308X, or 3090 processor (VTAM only) via the 3720 Communication Controller.

### HIGHLIGHTS

The 3669 is a synchronous signal converter designed to connect, under switched control, either a 3651 Store Controller mdl A60, B60, A75, C75 or D75 or two store loops to the PTT-supplied communications network. Diagnostic test functions are normally under control of the 3651 mdl A60, B60, A75, B75, C75 or D75 during initial power on. An additional switch setting allows the performance of manual diagnostic test. Auto answer is included as a standard feature.

**Attachment:** One cable is provided to interface to the store loop. One cable is provided to attach to the Communications line on a mdl 3.

**Customer Responsibilities:** (1) See M2700 pages ... (2) Customer is responsible for obtaining, installing, and testing the store loops. See "Installation Manual - Physical Planning" (GA27-3079) for the 3660 Supermarket System.

### SPECIFY

- Power (AC, 1-phase):

50 Hz		60 Hz	
110V	#2805	100V	#2730
123.5V	#2811	115V	#9901
200V	#2806	200V	#2732
220V	#2813	208V	#9902
235V	#2814	230V	#9904

- Machine Nomenclature (specify one):

English US	#2750	German	#2929
English UK	#2927	Spanish	#2931
French	#2928	Italian	#2932

### SPECIAL FEATURES

**Direct Line Attachment (#2939):** Available in some countries to meet PTT specifications to have the 3669 homologated. Consult your Teleprocessing Coordinator to determine if whether it is required. Maximum: One. Field Installation: Yes.

### RPQS

**PTT (RPQ 7B0211):** Mandatory Interface on 3669 Store Communication Unit.

**Note:** RPQ 7B0211 interfaces with mandatory PTT modems at 2400 bps. It can be used with dual communications adapter for leased backup connections or with single communications adapter for switched backup on host connection.

RPQ ZB7983 - 4800 BPS transmission speed on 3669 Model 3.

**(Canada only > RPQ 8Q0129:** Cable - Modem to Protective Coupler (DAA). This RPQ provides a 3669 modem cable equipped with a "quick-disconnect" plug type connector. This type connector is required for use on the Protective Coupler P/N 1649100 available from IBM. If the RPQ cable is not ordered, the 3669 will be shipped with a modem cable equipped with eight spade-lugs for use on screw terminal type connectors provided on some Protective Couplers not available from IBM. <)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES

Contact IBM.

## 3683 POINT OF SALE TERMINAL

### PURPOSE

A user-programmable input/output terminal for the 3650 Programmable Store System or the 3680 Programmable Store System which provides the point of sale transaction, data collection, credit authorization, price look-up and other inquiry and data entry functions. The self contained programmable segment allows the 3683 to continue most sales functions when disconnected from the 3651 Store Controller or the 3684 Point of Sale Control Unit, and after receiving a program load from the 3651 or the 3684.

### MODELS

A description of each available model of the 3683 is as follows:

**Model 1 001:** Comprised of a base unit with 32K bytes of base storage and an integrated printer. The cash receipt station is standard. Additional print stations, journal, validation or label printer may be added as features for a maximum of three print stations.

**Model 1A A01:** Same as the 3683 model 1 except that the 3683 model 1A has 56K bytes of base storage and provides for the attachment of a 3687 Checkout Scanner. Limitations: Cannot install Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422), non-IBM EAN/UPC Wand Attachment (#4946), Storage Increment-8K (#7710), Storage Increment-24K (#7730) or Expansion Feature I (#3880).

**Model 2 002:** Comprised of a base unit with 56K bytes of base storage and a 1- or 2-station distributed printer. The printer is contained in a separate set of covers cable connected to the base unit. The cable length is 3.6m (12 ft.). The cash receipt station is standard. Only the journal print station may be added to allow for a maximum configuration of two print stations. All other I/O (cash drawer, displays or keyboards) must be distributed or remote when used with this unit. Limitations: Cannot install Label Printer (#8726), Validation Printer (#8725), Integrated Cash Drawers (#1571 and #1573), Storage Increment-8K (#7710), or Storage Increment-24K (#7730).

**Model 2A A02:** Same as the 3683 model 2 except that the 3683 model 2A enables attachment of a 3687 scanner. Limitations: In addition to those listed under 3683 model 2, cannot install Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422), non-IBM EAN/UPC Wand Attachment (#4946), or Expansion Feature I (#3880).

**Model 3 003:** Comprised of a base unit with 56K bytes of base storage and a 1-, 2-, or 3-station distributed printer. The printer is contained in a separate set of covers cable connected to the base unit. The cable length is 3.6m (12 ft.). The cash receipt station is standard. Additional print stations, journal, validation or label printer may be added as features for a maximum configuration of three print stations. All other I/O (cash drawers, displays or keyboards) must be distributed or remote when used with this unit. Limitations: Cannot install Integrated Cash Drawers (#1571 or 1573), Storage Increment- 8K (#7710) or Storage Increment- 24K (#7730).

**Model 3A A03:** Same as the 3683 model 3 except that the 3683 model 3A provides for the attachment of a 3687 Scanner. Limitations: In addition to those listed under 3683 model 3 cannot install Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422), non-IBM EAN/UPC Wand Attachment (#4946), or Expansion Feature-1 (#3880).

**Limitations:** On 3683 mdls 1, 2 or 3, when six of the following features are installed, Storage Retention (#7785) is required.

IML Read Adapter	#4633
Magnetic Wand Reader	#4945*
Non-IBM EAN/UPC Wand Attachment	#4946*
Non-IBM OCR Hand-Held Reader Adapter	#5422*
Non-IBM Coin Dispenser Adapter	#5431
Non-IBM Scale Adapter	#5433
Storage Expansion-POS	#6991
Totals Retention	#8010

\* mutually exclusive

3683 mdls 1A, 2A or 3A will allow up to a maximum of three of the following features to be installed in the base unit before Expansion Feature-II (#3881) is required. When the features are installed, the sum of the unit values should not exceed 3. When the unit value exceeds 3 or if Storage Expansion-POS (#6991) is required, then Expansion Feature-II (#3881) must be installed.

Feature	Unit/Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
IML Read Adapter (#4633)	1

**Prerequisites:** 1) A 3651 Store Controller mdl 25 or 75 or 3684 Point of Sale Control Unit model 2 provides the control segment for the 3683. See M3651 or 3684 pages for details. 2) A keyboard, #2712 or #2713, and a display, #3331, #3332, #3346, or #3348 must be ordered for each 3683. If a 3683 mdl 2, 2A, 3 or 3A is ordered, a distributed display (#3335 or #3338) or a remote display (#3333 or #3337) are the only type of display that can be attached. A distributed keyboard attached by Distributed Keyboard Attachment (#3240) is the only keyboard that can be attached, and if a cash drawer is attached, it can only be attached by Cash Drawer -- Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577).

**Customer Responsibilities:** See S3650 and 3680 pages for general description of customer responsibilities.

**Proposal/Acknowledgement Letter Statements:** Each Proposal and Acknowledgment Letter must include the following statement:

"It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3683 which contains cash or other valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations.

When a failure occurs in the cash drawer of any 3683, and it cannot be opened prior to maintenance by IBM, the customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

**Customer Setup:** The 3683 will be shipped with customer setup instructions. The customer is responsible for:

- Unpacking, placement, set up and checkout of the 3683 at time of delivery, or when relocating the 3683.
- Relocation of the 3683 (if required) to allow IBM service access.
- Using and following the 3683 Problem Determination Procedures.

**Maintenance:** 3683s located in the immediate sales area may preclude the customer acceptability of online repair due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer should remove the failing terminal to a repair facility located within the store for subsequent repair. At this location the CE will repair and test the terminal online via a customer-provided store loop termination.

### HIGHLIGHTS

A modular input/output unit with features and mdls that provide for an integrated or distributed terminal. It features data entry by keyboard or from a Magnetic, non-IBM EAN/UPC or a non-IBM OCR Hand-Held Reader or from a 3687 Checkout Scanner and data output via an 8-digit numeric display, with up to 32 indicators for operator guidance and machine status conditions, or an alphanumeric display with 36 character positions and printing of data under program control. The minimum configuration must include a base unit plus a Keyboard and a Display (see "Prerequisites"). The 3684 mdl 2, as well as the 3651 mdl 25 or 75, is capable of transmitting or receiving data with several 3683s over a 2400 bps loop. The 3651 mdl 75 and the 3684 mdl 2 are capable of transmitting or receiving data with several 3683s, all mdls, over a 4800 bps loop. Separate printer-based mdls (2, 2A, 3, and 3A) of the 3683 are available to provide the ability to distribute the printer from the bases unit. All I/O devices (cash drawers, displays, keyboards) must be distributed when these mdls are designated.

**Base Unit:** Provides (1) the base electronic storage and intelligence and an audible alarm; and, (2) a matrix printer with cash receipt station. Basic storage for the 3683 mdl 1 is 32K bytes. This can be increased to 56K bytes by Storage Increment features and to 120K bytes via the Storage Expansion feature. The base storage for the 3683 mdls 1A, 2, 2A, 3 and 3A is 56K bytes. They also can be increased to 120K bytes via the Storage Expansion feature. An audible alarm, activated when system operation, is also part of the base unit.

**Printer:** A matrix, bidirectional printer which prints a 38-character print line at 15 characters per 25.4mm (inch) spacing. Vertical spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. It uses an easily replaceable cartridge ribbon. In addition to the standard character sets, an all-points addressable capability allows (by customer programming) printing of customer logo and special graphics including Kanji. Additional print stations can be ordered as features. The cash receipt station will accept 88.9mm (3.5 in.) diameter roll paper, 69.85mm (2.75 in.) wide.

**Storage Increments:** When storage on a 3683 mdl 1 is upgraded from 40K to 48K or to 56K by field installation, the new Storage Increment feature displaces the old. Removed parts belong to the customer. Prior to using a removed module in another 3683 the compatibility of the part should be verified and an RPQ must be submitted to allow reinstallation on another machine.

### SPECIFY

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	120V #2800
200V #2806	
220V #2813	
230V #2821	
240V #2801	

**Note:** A 2.8m (9 ft) power cord and plug will be shipped with each machine from the plant of manufacture. The country code will be used to select a power cord and plug to the specifications most commonly used in that country.

Specify #2710 for power cord without a plug.

For Canada only, specify #9890 for locking plug or #9891 for non-locking plug (both at 60 Hz, 120 Volts, 1-phase).

For Japan only, specify #9890 for locking plug or #9881 for non-locking plug (for either 50 Hz or 60 Hz, 100 volts, 1-phase).

**Note:** 120V AC, 60 Hz is compatible with existing 115V systems.

- Machine Nomenclature:

Canadian English #2934  
Canadian French #2935  
English US #2950  
Japanese #2930  
Spanish #2931

- Loop Speed: Specify #9420 for 2400 bps loop speed or #9430 for 4800 bps loop speed.
- Controller Designation: Specify #9493 on the 3651 controller for 3683 control code if 3683 terminals are attached to the 3651 controller and if a 3680 system is not attached to the same host system. See "Specify" in M3651 pages.

### SPECIAL FEATURES

**Cash Drawer-Integrated-First (#1571):** (Mdls 1, 1A) Provides a cash drawer with housing with removable till that is integrated with the 3683 base unit. The cash drawer has a media slot that will accommodate approximately a 25mm (1in.) stack of documents. Opening the cash drawer is under program control. A cash drawer lock is provided. See note below for special ordering instructions for lock and removable bill dividers. Maximum: One. Limitations: Only one additional cash drawer may be ordered - either Cash Drawer Integrated-Second (#1573), Cash Drawer Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577). Field Installation: Yes.

**Cash Drawer-Integrated-Second (#1573):** (Mdls 1, 1A) Provides a second Integrated Cash Drawer with housing and removable till that is installed directly below Cash Drawer-Integrated-First (#1571). Functionally equivalent to Cash Drawer-Integrated-First (#1571). Maximum: One. Prerequisites: #1571. Field Installation: Yes.

**Cash Drawer-Distributed (#1575):** Provides a distributed cash drawer with housing and removable till that can be located up to 3.6m (12 ft) from the 3683 base. Functionally equivalent to Cash Drawer-Integrated-First (#1571). Maximum: Two, if no other drawer is ordered. One, if Cash Drawer Integrated-First (#1571) or non-IBM Cash Drawer Attachment (#1577) is ordered. Field Installation: Yes.

**Non-IBM Cash Drawer Attachment (#1577):** Provides an IBM-defined interface with cable and other plug for attaching a non-IBM Cash Drawer. Maximum: Two, if no IBM Cash Drawer is ordered. One, if a Cash Drawer Integrated-First (#1571) or Cash Drawer Distributed (#1575) is ordered. Limitations: An attached non-IBM Cash Drawer must meet the IBM-defined interface as stated in the IBM 3680 PSS Cash Drawer Attachment (FC #1577) Product Attachment Information available from Industry Relations. Field Installation: Yes.

### Notes:

- For cash drawer tills and covers, see "Accessories".
- Specify #9799 for each IBM cash drawer ordered (#1571, #1573 or #1575) if a till with movable bill dividers is desired.
- Cash Drawer Lock: Each IBM cash drawer (#1571, #1573 or #1575) is equipped with a lock. A group of 25 unique lock numbers has been reserved to allow a customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following features on the cash drawer order:

#9101	#9106	#9111	#9116	#9121
#9102	#9107	#9112	#9117	#9122
#9103	#9108	#9113	#9118	#9123
#9104	#9109	#9114	#9119	#9124
#9105	#9110	#9115	#9120	#9125

If none is specified, a lock will be selected at random from a larger group of lock types. Each cash drawer will be shipped with two cash drawer keys.

**Distributed Keyboard Attachment (#3240):** Provides for locating the keyboard up to 3.6m (12 ft) from the 3683 base. Prerequisites: #2712 or #2713. Maximum: One. Field Installation: Yes.

**Display, One-Sided (#3331):** An operator display and guidance unit consisting of an 8-digit numeric display and 32 indicators for operator guidance and machine status. The display is used to display numeric input or output data such as item number, totals, amount due, etc. The 32 indicator lights point to labels that describe machine status or guidance. The unit will be shipped with the indicators labeled to correspond to the country language specified. However, the customer may re-label all but five indicators and, under customer program control, define their use. A legend sheet, with a variety of legends, will be shipped with each machine. Maximum: One. Limitations: Cannot be ordered with Display-Two Sided (#3332), Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Display, Two-Sided (#3332):** An operator and customer display guidance unit which contains all the functions of Display, One-Sided (#3331) plus an 8-digit numeric display with 6 indicators on the back of the unit for customer viewing. Maximum: One. Limitations: Cannot be installed with Display-One Sided (#3331), Display-Customer Remote (#3333), Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Display-Customer Remote (#3333):** A customer display and status indicator unit that is connected to the 3683 by a 3.6m (12 ft) cable. The unit consists of an 8-digit numeric display and 12 indicators (6 are shipped with labels and 6 without). All are re-legenable. The display and indicators are under customer program control. Maximum: One. Prerequisites: #3331. Limitations: Cannot be installed with the Display-Two Sided (#3332), Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Distributed Display Attachment (#3335):** Provides for distributing Display-One Sided (#3331) or Display-Two Sided (#3332) up to 3.6m (12 ft) from the 3683 base. Maximum: One. Prerequisites: #3331 or #3332. Limitations: Cannot be installed with Alphameric Display (#3336), Remote Second Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Alphameric Display (#3336) (NO LONGER AVAILABLE):** An operator/customer display consisting of two rows of 18 characters, each for a total of 36 characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3683. Maximum: One. Limitations: Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335). Field Installation: Yes.

**Remote Second Alphameric Display (#3337) (NO LONGER AVAILABLE):** A customer display that is connected to the 3683 by a 3.6m (12 ft) cable. The display consists of two rows of 18 characters each, for a total of 36 characters and is used to display numeric as well as alphabetic data such as item number, description, etc. Maximum: One. Prerequisites: #3336. Limitations: Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335). Field Installation: Yes.

**Distributed Alphameric Display Attachment (#3338) (NO LONGER AVAILABLE):** Provides for distributing the Alphameric Display (#3336) up to 3.6m (12 ft) from the 3683 base. Maximum: One. Prerequisites: #3336. Limitations: Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). Field Installation: Yes.

**Alphameric Display, Type II (#3346):** An operator/customer display consisting of two rows of 18 characters each for a total of 36 characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3683. Maximum: One. Limitations: Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335) or with Alphameric Display (#3336 or #3337). Field Installation: Yes.

**Distributed Alphameric Display, Type II, Attachment (#3348):** Provides for distributing the Alphameric Display, Type II (#3346) up to 3.6m (12 ft) from the 3683 base. Maximum: One. Prerequisites: #3346. Limitations: Cannot be installed with a numeric display

(#3331, #3332, #3333 or #3335) or with an Alphameric Display (#3336 or #3337). Field Installation: Yes.

**Expansion Feature-I (#3880):** (Mdl 1, 2, 3) Provides facilities to accommodate additional features that cannot be installed on the base unit. Prerequisites: On 3683 mdls 1, 2 or 3, this feature is a prerequisite to install any of the following: IML Read Adapter (#4633), Magnetic Wand Reader (#4945), Non-IBM EAN/UPC Wand Attachment (#4946), Non-IBM OCR Hand-Held Reader Adapter (#5422), Non-IBM Coin Dispenser Adapter (#5431), Non-IBM Scale Adapter (#5433). Maximum: One. Limitations: Cannot be installed with Expansion Feature-II (#3881) or with Storage Expansion-POS (#6991). This feature will allow installation of up to a maximum of four of the following features. When the features are installed the sum of the unit values should not exceed 4. Field Installation: Yes.

Feature	Unit/Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
*Non-IBM OCR Hand-Held Reader Adapter (#5422)	1
*Magnetic Wand Reader (#4945)	1
IML Read Adapter (#4633)	1
*Non-IBM EAN/UPC Wand Attachment (#4946)	2

\* mutually exclusive

**Expansion Feature-II (#3881):** Provides expanded facilities on the 3683 to permit installation of features not accommodated by the base unit (all mdls) or by the addition of Expansion Feature I (#3880) on 3683 mdls 1, 2 or 3. Prerequisites: This feature is a prerequisite to install Storage Expansion-POS (#6991) and displaces Expansion Feature-I (#3880), if installed on 3683 mdls 1, 2 or 3. This feature is a prerequisite if both the non-IBM EAN/UPC Wand Attachment (#4946) and the IML Read Adapter (#4633) are to be installed. Limitations: Cannot be installed with Expansion Feature-I (#3880). Maximum: One. Field Installation: Yes.

**IML Read Adapter (#4633):** Provides a means to initialize 3683 terminals when a 3684 mdl 2 is unavailable or unable to provide the IML (Initial Machine Load), or provides a means to initialize 3683, 3653 mdls 1 (EC 349653 or higher is prerequisite) and IP, or 3663 mdls IP and 3P terminals when a 3651 Store Controller mdl 25 or 75 with a 3683 attached to its loop is unavailable or unable to provide the IML. An adapter is provided for attaching an external user-provided tape cassette recorder and reading data previously recorded at a 3684 mdl 2 with the IML Write Adapter (#4634), or at a 3651 mdl 25 or 75 with the IML Write Adapter (#4633). (Refer to "IBM 3680 Planning and Site Preparation Guide", GA27-3213, for cassette recorder interface requirement.) Prerequisites: On 3683 mdls 1, 2 or 3, #3880 or #3881 is a prerequisite to this feature if the non-IBM EAN/UPC Wand Attachment (#4946) is installed. Maximum: One. Field Installation: Yes.

**Journal Lock (#4690):** Provides a special lock and security cover over the printed journal. See note below for special lock selections. Maximum: One. Prerequisites: #4695. Field Installation: Yes.

**Journal Printer (#4695):** Provides a journal print station with a journal roll take-up mechanism. Print line length is 38 characters at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer permit the customer to highlight exceptions through special graphics designed and controlled by user programming. A 12.7mm (0.5 in.) signature window is provided. The journal station will accept 88.9mm (3.5 in.) diameter roll paper, 69.85mm (2.75 in.) wide. Maximum: One. Field Installation: Yes.

**Manager Keylock (#4905):** Provides a keylock mounted on the keyboard that allows customer programming to interrogate the position of the keylock when the key is operated. Possible uses include the enforcement of a manager override to a restricted security function.

See note below for special lock selection. Maximum: One. Prerequisites: #2712 or #2713. Field Installation: Yes.

**Note:** Two groups of ten unique specify numbers have been reserved to allow a customer to order a specific journal lock or manager keylock for each terminal. (The 3683 and 3684 use the same journal lock and manager keylock numbers, therefore all terminals within a store could have the same lock if desired.) If the same lock is desired on the journal and manager keylock, specify the respective locks with the same value in the last digit. That is, if #9203 and #9303 are specified, the same lock (#9203) will be installed at both locations.

#### Journal Lock      Manager Keylock

#9201	#9301
#9202	#9302
#9203	#9303
#9204	#9304
#9205	#9305
#9206	#9306
#9207	#9307
#9208	#9308
#9209	#9309
#9210	#9310

If none is specified, a lock will be selected at random from a larger group of lock types. Each lock feature will be shipped with two keys. For additional or replacement keys, see "Accessories".

**Keyboards, General:** All keyboards have customer legendable keybuttons except for 11 keybuttons which have molded legends. All single and double function keys are under customer program control. Double keys may be moved, added or deleted by the user. Several colors and sizes of decal sheets with common legends by country language will be shipped with the 3683. See "Accessories" for released keybuttons that may be ordered for any unique customer requirement. Maximum: One keyboard (#2712 or #2713). Field Installation: Yes.

**35-Key Modifiable Keyboard (#2712):** A 35-key keyboard that includes:

- 5 Legended system function keys.
- 19 Unlegended function keys.
- 11 Keys with round, numeric legended keybuttons in the data entry arrangement.

**48-Key Modifiable Keyboard (#2713):** A 48-key keyboard that includes:

- 5 Legended system function keys.
- 32 Unlegended function keys.
- 11 Keys with round, numeric legended keybuttons in the data entry arrangement.

**Magnetic Wand Reader (#4945):** (Mdl 1, 2, 3) A hand operated wand used to read single track delta distance encoded magnetic merchandise tickets, credit cards, employee badges, etc. The small lightweight wand attached via a 1.2 meter (4 foot) long, flexible cord allows encoded merchandise tickets to be read without removing them from the merchandise. See note. Prerequisites: On 3683 mdls 1, 2 or 3, #3880 or #3881. Limitations: Cannot be installed with a non-IBM EAN/UPC Wand Attachment (#4946) or a non-IBM OCR Hand-Held Reader Adapter (#5422). Maximum: One. Field Installation: Yes.

**Note:** The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request from Industry Relations.

**Non-IBM EAN/UPC Wand Attachment (#4946):** (Mdl 1, 2, 3) Provides an adapter to support the attachment of a non-IBM EAN/UPC Bar Code hand-held wand reader. This feature provides an external connector to attach the non-IBM wand reader. The types of wand readers that can attach to this feature are either analog output wand readers (Intermec 1233R or equivalent) or digital output wand readers (Hewlett-Packard HEDS 3000 or equivalent) that meet the requirements stated in the Non-IBM EAN/UPC Wand Reader Attachment, Product Attachment Information for the 3650/3680 document which is available from Industry Relations/Product Information Corporate Headquarters Armonk. Prerequisites: On the 3683 Mdl 1, 2 or 3 Expansion Feature #3880 or #3881. Also on the 3683 Mdl 1, 2 or 3 Expansion Feature II (#3881) is a prerequisite to this feature if the IML Read Adapter (#4633) is installed. The IBM Multiple Supplier Systems Bulletin, GI20-6648, applies to the non-IBM wand reader. Limitations: When this attachment is used with an analog output wand reader, it is possible that this feature may experience failures if operated within five miles of a high power AM transmitter of the type used for television broadcasting. Cannot be installed with the Magnetic Wand Reader (#4945) or non-IBM OCR Hand Held Reader Adapter (#5422). Maximum: One. Field Installation: Yes. Specify: #9660 for analog wand interface or #9661 for digital wand interface.

**Non-IBM OCR Hand-Held Reader Adapter (#5422):** (Mdl 1, 2, 3) Provides an adapter to support the attachment of an IBM 3687 Mdl 2 Checkout Scanner or a non-IBM OCR hand-held wand reader that meets the requirements stated in the IBM Retail System OCR A/B Wand Reader Product Attachment Information document which is available from Industry Relations. This feature provides a 1.83 meter (6 foot) cable with an ITT--Cannon DBC-25S type connector to attach the IBM 3687 Mdl 2 or the non-IBM OCR Hand-Held Reader unit. Prerequisites: On 3683 Mdl 1, 2 or 3, #3880 or #3881. Limitations: Cannot be installed with a non-IBM EAN/UPC Wand Attachment (#4946) or a Magnetic Wand Reader (#4945). Maximum: One. Field Installation: Yes.

**Non-IBM Coin Dispenser Adapter (#5431):** Provides an IBM-defined serial interface for attaching a non-IBM-manufactured coin dispenser that meets the requirements stated in the "IBM 3680 PSS System non-IBM Coin Dispenser Adapter Product Attachment Information" document which is available from Industry Relations. For further information on the attachment, refer to the Market Support Center. Prerequisites: On 3683 mdls 1, 2 or 3, #3880 or #3881. There is no prerequisite feature on a 3683 mdl 1A, 2A or 3A. Maximum: One. Field Installation: Yes.

**Non-IBM Scale Adapter (#5433):** Provides an IBM defined serial or parallel interface for attaching a non-IBM manufactured scale that meets the requirements stated in the "IBM 3680 PSS System non-IBM Scale Adapter Product Attachment Information" document which is available from Industry Relations. For further information on the attachment, refer to the Market Support Center. Specify: #9385 if Serial Interface is to be installed; #9386 if Parallel Interface is to be installed. On Parallel Interface also specify #9387 if scale is a 10kg Metric scale. On Serial Interface specify #9388 if scale is a 5-digit scale. Otherwise, scale is assumed to be a 4-digit scale. Prerequisites: On 3683 mdls 1, 2 or 3, #3880 or #3881. There is no prerequisite feature on a 3683 mdl 1A, 2A or 3A. Maximum: One. Field Installation: Yes.

**Storage Expansion-POS (#6991):** Provides the capability for expanding the storage capacity of a 3683 from a maximum of 56K to a maximum of 120K bytes. This feature permits installation of up to four 16K Storage Increments (#7720) on 3683s. Prerequisites: Expansion Feature II (#3881) must be installed. In addition, the 3683 mdl 1 must have Storage Increment -- 24K (#7730) installed. Maximum: One. Field Installation: Yes.

## 3683 MDL 1 STORAGE CONFIGURATOR

*-----*	
	Base Storage
32K	8K - #7710, or
40K	16K - #7720, or
48K	24K - #7730
56K	
-----	
	Expansion Feature II - #3881
-----	
	Storage Expansion-POS-#6991
	(#7730 and #3881 are prerequisites)
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)
*-----*	

## 3683 MDL 1A, 2, 2A, 3, OR 3A STORAGE CONFIGURATOR

*-----*	
	Base Storage
56K	
-----	
	Expansion Feature II - #3881
-----	
	Storage Expansion-POS-#6991
	(#3881 is a prerequisite)
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)
*-----*	

**Storage Increment--8K (#7710):** (Mdl 1) Provides an additional 8,192 bytes of storage. Maximum: One. Limitations: Cannot be installed with Storage Increments--16K (#7720) or Storage Increment--24K (#7730) or on a 3683 mdl 1A, 2, 2A, 3 or 3A. Field Installation: Yes.

**Storage Increment--16K (#7720):** Provides an additional 16,384 bytes of storage. Maximum: One, if Storage Expansion-POS (#6991) is not installed; four, if Storage Expansion-POS (#6991) is installed. Limitations: Cannot be installed with Storage Increment--8K (#7710) or 24K (#7730) or on the 3683 mdls 1A, 2, 2A, 3 or 3A unless Storage Expansion-POS (#6991) is installed. Field Installation: Yes. Note: If Storage Increment--8K (#7710) is installed, it must be removed to install this feature.

**Storage Increment--24K (#7730):** (Mdl 1) Provides an additional 24,576 bytes of storage. Maximum: One. Limitations: Cannot be installed with #7710 or #7720. Field Installation: Yes. Note: If Storage Increment--8K (#7710) or Storage Increment--16K (#7720) is already installed, it must be removed to install this feature.

**Storage Retention (#7785):** Provides an internal battery and charger to power storage during a power interruption. All data and programs are protected so that a transaction in process when power was interrupted will continue when primary power is restored. The duration of storage retention depends on the charged state of the battery. When fully charged, storage will be retained for approximately 12 minutes. The number of times the battery is discharged greatly affects battery life; therefore, facilities are provided to allow the customer through programming, to deactivate the battery for scheduled power off conditions such as store closing. Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. Replacement batteries may be ordered through IBM (see "Accessories") or through other sources that meet the supply battery specifications as defined by IBM. Maximum: One. Field Installation: Yes. Prerequisites: Storage Retention (#7785) had to be specified on 3683 mdls 1, 2 or 3 when six of the following features are installed:

#4633	#5431
#4945*	#5433

#4946*	#6991
#5422*	#8010

\* mutually exclusive

**Totals Retention (#8010):** Provides an additional 240 bytes of customer programmable storage that are powered by its own battery to protect loss of information such as totals, transaction number, terminal address, etc. when power is turned off or power interruptions occur. An early warning status condition will be given to the program when the battery needs replacing. Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. (See "Accessories" for battery life characteristics and types of batteries required for replacement.) Maximum: One. Field Installation: Yes.

**Validation Printer (#8725):** (Mdls 1,1A, 3, 3A) Provides a flatbed document validation station for printing on inserted forms. Prints 38 characters per line at 15 characters per 25.4mm (inch). Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer allow logos, special graphics including Kanji and highlighting to be designed and printed by user programming. Maximum: One. Limitations: Cannot be installed with Label Printer (#8726). Field Installation: Yes.

**Label Printer (#8726):** (Mdls 1,1A, 3, 3A) Provides a flatbed station capable of printing on inserted forms or labels. Includes the capabilities of the Validation Printer Feature (#8725) and in addition includes the capability of printing labels. Prints 38 characters per line at 15 characters per 25.4mm (inch). Vertical line spacing is 6.3 lines per 25.4mm (inch) at the rate of 20 lines per second. The all points addressable characteristics of the printer allow logos, special graphics, and highlighting to be designed and printed by user programming. Label printing capabilities include "card stock"; shelf labels and gummed labels on a carrier. Maximum: One. Limitations: Cannot be installed with Validation Printer (#8725). Field Installation: Yes. Note: If the Label Printer feature is to be field installed in place of the Validation Printer (#8725), removed parts belong to the customer.

## MODEL CONVERSIONS

Only upgrades to the "A" model designation from the same base model are available in the field (e.g., 1 to 1A). Customer Price Quotations and Customer Order Acknowledgement letters for purchase MESs must state "Installation of this base mdl change involves the removal of parts which become the property of IBM." Prerequisites: When upgrading a 3683 model 1 to a 3683 model 1A, Storage Increment-24K (#7730) is required.

## ACCESSORIES

**Battery, Storage Retention (P/N 8543856):** \*\* A nickel cadmium battery that will provide power to retain data and programs in main storage and registers during a primary power interruption. A 12.5 volt battery is shipped with the initial order for Storage Retention Feature #7785.

**Battery, Totals Retention:** Provides power for 240 bytes of storage to secure totals, transaction sequence number, terminal address, and other user-defined data against power off or power interruptions. This power source (Eveready #E134, Mallory TR134R or equivalent) is customer replaceable. The capacity rating of this type of battery when new is approximately 1,000 milliamp hours. The life of the battery is determined by the shelf life which is approximately 9,000 hours. This means if a battery is installed in a 3683 six months after manufacture, its useful machine life will be six months on the average. It is recommended that the user's program test the battery state at least once per day. When the battery condition reaches the low threshold state, there are approximately 72 hours of battery life left. Procurement and replacement of the battery is the customer's responsibility. The customer must ensure

that the power is "On" on the terminal when the battery is replaced or all information will be lost.

**Cash Till and Cover With Lock:** Additional cash tills and till covers with locks may be ordered.

- Cash Till Cover with Lock and Keys P/N 1851126
- Cash Till P/N 1860161

**Note:** See "Locks and Keys" later in this section.

**Keyboard Accessories:** The following terms are used in the KEYTOP descriptions:

Version Stem Number/Key Alignment

OV	One/Vertical
OH	One/Horizontal
OVH	One/Vertical or Horizontal
TV	Two/Vertical
TH	Two/Horizontal

-B Small raised projection in keytop  
-C Circular, concave top on key button  
-M Minimal concavity of circular keytop

Size	Units
Square	1 x 1
Single	1 x 1-1/3
Long	1 x 2
Double	1-1/3 x 2

**Engraved Keytops:** Keytops containing pre-defined messages are available for use on the 3683 terminal keyboards. Blank keytops are also available for customer engraving.

**Retail Keytops:** The following is a list of pre-defined keytops available in the 3650/3680 PSS-Retail Store System nomenclature:

World Trade Nomenclature					
NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
Canadian French:					
ANNUL	Red	Square	OH	Std	1854455
1 COMPT	White	Square	OH	Std	1854850
2 SPCL	White	Square	OH	Std	1854851
5 A LIV	White	Square	OH-B	Std	1854853
3 FICHE	White	Square	OH	Std	1855415
4 P LIV	White	Square	OH	Std	1855416
6 PLAN A	White	Square	OH	Std	1855417
7 PLAN B	White	Square	OH	Std	1855418
8 PLAN C	White	Square	OH	Std	1855419
9 PLAN D	White	Square	OH	Std	1855420
ENTREE DE DONNEES	Blue	Single	OH	Std	1854511
CODE NON MDISE	Blue	Single	OH	Std	1854512
CODE REDUCT	Blue	Single	OH	Std	1854515
RAYON	Blue	Single	OH	Std	1854516
ARTICLE	Blue	Single	OH	Std	1854519
QTE	Blue	Single	OH	Std	1854520
CODE TAXE	Blue	Single	OH	Std	1854523
CLASSE	Blue	Single	OH	Std	1854541
SOUS- TOTAL	Blue	Single	OH	Std	1854854
VERSEMT	Blue	Single	OH	Std	1854421
SANS TAXE	Blue	Single	OH	Std	1855422
CODE ESCOMPTE	Blue	Single	OH	Std	5994141
RETOUR	Blue	Single	OH	Std	5994142

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
France:					
ANNUL	Red	Square	OH	Std	1854455
1 COMPT	White	Square	OH	Std	1854850
2 SPCL	White	Square	OH	Std	1854851
5 A LIV	White	Square	OH-B	Std	1854853
3 FICHE	White	Square	OH	Std	1855415
4 P LIV	White	Square	OH	Std	1855416
6 PLAN A	White	Square	OH	Std	1855417
7 PLAN B	White	Square	OH	Std	1855418
8 PLAN C	White	Square	OH	Std	1855419
9 PLAN D	White	Square	OH	Std	1855420
ENTREE DE DONNEES	Blue	Single	OH	Std	1854511
CODE NON MDISE	Blue	Single	OH	Std	1854512
RENDU	Blue	Single	OH	Std	1854513
CODE REDUCT	Blue	Single	OH	Std	1854515
RAYON	Blue	Single	OH	Std	1854516
FAMILLE	Blue	Single	OH	Std	1854517
ARTICLE	Blue	Single	OH	Std	1854519
QTE	Blue	Single	OH	Std	1854520
CODE REMISE	Blue	Single	OH	Std	1854522

## MACHINES

CODE TAXE	Blue	Single	OH	Std	1854523
SOUS- TOTAL	Blue	Single	OH	Std	1854854
VERSEMT	Blue	Single	OH	Std	1854421
SANS TAXE	Blue	Single	OH	Std	1855422
ANNUL	Red	Single	OH	Std	5188395
'	Blue	Single	OH	Std	5188400
CODE TVA	Blue	Single	OH	Std	5188401
PAIEMENT	Blue	Single	OH	Std	5188404
RENDU	Red	Single	OH	Std	5188417
CODE REMISE	Red	Single	OH	Std	5188418
CODE REDUCT	Red	Single	OH	Std	5188419
MODIF ETIQ	Blue	Single	OH	Std	5188420
EFFACER	White	Single	OH	Std	5188422
VENTE	White	Long	TH	Std	5188416
EFFACER	White	Double	TV	Std	5188407
MODIF ETIQ	Blue	Double	TV	Std	5188408
ENTREE	Blue	Double	TV	Std	5188411
QTE	Blue	Double	TV	Std	5188412
TOTAL	Blue	Double	TV	Std	5188413
ENTREE	Blue	Double	TV	R-1/8	5188421

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
Germany:					
STORN	Red	Square	OH	Std	1854465
1 BAR	White	Square	OH	Std	1854466
2 SOND	White	Square	OH	Std	1854467
3 SCHCK	White	Square	OH	Std	1854468
4 NACHN	White	Square	OH	Std	1854469
5 RUCKL	White	Square	OH-B	Std	1854470
6 KRD-A	White	Square	OH	Std	1854471
7 KRD-B	White	Square	OH	Std	1854472
8 KRD-C	White	Square	OH	Std	1854473
9 KRD-D	White	Square	OH	Std	1854474
3 BELEG	White	Square	OH	Std	5188456
5 RUCKL	White	Square	OH	Std	5188476
MWST	Blue	Single	OH	Std	1650751
RUCK GABE	Blue	Single	OH	Std	1854526
ZAHLUNG	Blue	Single	OH	Std	1854527
NACH-LASS	Blue	Single	OH	Std	1854528
ABTEILG	Blue	Single	OH	Std	1854529
WARENGR	Blue	Single	OH	Std	1854530
ARTIKEL NR	Blue	Single	OH	Std	1854531
MENGE	Blue	Single	OH	Std	1854532
ZWISCH SUMME	Blue	Single	OH	Std	1854533
KEINE ART-NR	Blue	Single	OH	Std	1854836
RABATT	Blue	Single	OH	Std	1854837
DATEN EINGABE	Blue	Single	OH	Std	1855429
STORNO	Red	Single	OH	Std	5188446
RUCKGABE	Blue	Single	OH	Std	5188447
ABTEILG	Blue	Single	OH	R-1/8	5188452
RABATT CODE	Blue	Single	OH	Std	5188453
NACHLASS CODE	Blue	Single	OH	Std	5188457
ABTEILG	Blue	Single	OH	Std	5188477
ETIKETT ANDERN	Blue	Single	OH	Std	5188478
EINGABE	Blue	Single	OH	R-1/8	5188480
EINGABE	Blue	Single	OH	Std	5188482
BAR	Blue	Single	OH	Std	5188483
,/.	Blue	Single	OH	Std	5996913
O KEIN VERK	White	Long	TH	Std	5188468
LOSCHEN	White	Double	TV	Std	5188459
ETIKETT ANDERN	Blue	Double	TV	Std	5188460
EINGABE	Blue	Double	TV	R-1/8	5188463
MENGE	Blue	Double	TV	R-1/8	5188464
END SUMME	Blue	Double	TV	Std	5188465
ETIKETT ANDERN	Blue	Double	TV	Std	5188479
MENGE	Blue	Double	TV	Std	5188484
END SUMME	Blue	Double	TV	R-1/8	5188485

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
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MACHINES

Italy:					
ANNUL	Red	Square	OH	Std	1854455
1 CONT	White	Square	OH	Std	1854475
2 SPEC	White	Square	OH	Std	1854476
3 DOCUM	White	Square	OH	Std	1854477
4 PAC	White	Square	OH	Std	1854478
5 PREN	White	Square	OH-B	Std	1854479
6 CR A	White	Square	OH	Std	1854480
7 CR B	White	Square	OH	Std	1854481
8 CR C	White	Square	OH	Std	1854482
9 CR D	White	Square	OH	Std	1854483
CODICE IVA	Blue	Single	OH	Std	1752493
IMMISS DATI	Blue	Single	OH	Std	1854535
DIVERSI	Blue	Single	OH	Std	1854536
RESO- ACCRED	Blue	Single	OH	Std	1854537
PAGAM	Blue	Single	OH	Std	1854538
RIDUZ PREZZO	Blue	Single	OH	Std	1854539
REPARTO	Blue	Single	OH	Std	1854540
CLASSE	Blue	Single	OH	Std	1854541
ARTIC	Blue	Single	OH	Std	1854542
QUANT	Blue	Single	OH	Std	1854543
TOTALE PARZ	Blue	Single	OH	Std	1854544
TIPO SCONTO	Blue	Single	OH	Std	1854545
ANNUL	Red	Single	OH	Std	5188395
RESO- ACCRED	Red	Single	OH	Std	5188499
REPARTO	Brown	Single	OH	R-1/8	5188502
TIPO SCONTO	Red	Single	OH	Std	5188503
CLASSE	Brown	Single	OH	R-1/8	5188504
RIDOZ PREZZO	Red	Single	OH	Std	5188505
ARTIC	Brown	Single	OH	R-1/8	5188507
CONT	Blue	Single	OH	Std	5188514
,/.	Blue	Single	OH	Std	5996913
O CASSA	White	Long	TH	Std	5188513
REGISTR	White	Double	TV	R-1/8	1650333
TOTALE	White	Double	TV	R-1/8	1650334
AZZERA	White	Double	TV	R-1/8	5188508
MODIF ETICH	Blue	Double	TV	Std	5188509
QUANT	Blue	Double	TV	Std	5188511
MODIF ETICH CONT	Blue	Double	TV	Std	5188515
CONT	Blue	Double	TV	Std	5188539

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
Spain:					
ANUL	Red	Square	OH	Std	1648534
4 PCE	White	Square	OH	Std	1648538
5 SENAL	White	Square	OH-B	Std	1648539
1 CONT	White	Square	OH	Std	1854475
2 ESPCL	White	Square	OH	Std	1854787
3 M ESP	White	Square	OH	Std	1854788
6 CGO A	White	Square	OH	Std	1854791
7 CGO B	White	Square	OH	Std	1854792
8 CGO C	White	Square	OH	Std	1854793
9 CGO D	White	Square	OH	Std	1854794
FAMIL	Blue	Single	OH	Std	1648535
REF	Blue	Single	OH	Std	1648536
CODIGO DE BONIF	Blue	Single	OH	Std	1648537
SUB TOTAL	Blue	Single	OH	Std	1853925
ENTRADA DATOS	Blue	Single	OH	Std	1854771
CODIGO DE VACIO	Blue	Single	OH	Std	1854772
CREDITO DEVOLCN	Blue	Single	OH	Std	1854773
PAGO	Blue	Single	OH	Std	1854774
DEPTO	Blue	Single	OH	Std	1854776
CANT	Blue	Single	OH	Std	1854778
CODIGO DESCTO	Blue	Single	OH	Std	1854779
CODIGO IMPSTO	Blue	Single	OH	Std	1854780
ANUL	Red	Single	OH	Std	5188540
DEPTO	Blue	Single	OH	R-1/8	5188541
FAMIL	Blue	Single	OH	R-1/8	5188542
REF	Blue	Single	OH	R-1/8	5188543
MODIF ETIQ	Blue	Single	OH	Std	5188548
MODIF ETIQ	Blue	Single	OH	R-1/8	5188550

MACHINES

INTRO	Blue	Single	OH	R-1/8	5188551
INTRO	Blue	Single	OH	Std	5188552
,/.	Blue	Single	OH	Std	5996913
NO VENTA	White	Long	TH	Std	5188547
TOTAL	Blue	Double	TV	Std	5188413
CONT	Blue	Double	TV	Std	5188539
BORRADO	White	Double	TV	R-1/8	5188544
INTRO	Blue	Double	TV	R-1/8	5188545
CANTIDAD	Blue	Double	TV	Std	5188546
MODIF ETIQ	Blue	Double	TV	R-1/8	5188549
TOTAL	Blue	Double	TV	R-1/8	5188555
MODIF ETIQ	Blue	Double	TV	R-1/8	5188578
MODIF ETIQ	Blue	Double	TV	Std	5189668

Japan:

A selection of engraved keytops in Japanese nomenclature is available for ordering by the customer.

**Supermarket Keytop:** The following is a list of pre-defined keytops available in the 3650/3680 PSS-Supermarket Store System nomenclature:

NAME	COLOR	World Trade Nomenclature SIZE VERSION HEIGHT	P/N
Canadian French:			
/	White	Square OH-CM Std	5192956
QUVERT PERM	Blue	Single OH Std	1641016
DIVERS H	Blue	Single OH Std	1641020
VERIF CHEQUE 1	Blue	Single OH Std	1641065
CHEQUE F	Blue	Single OH Std	1641069
QTE C	Blue	Single OH Std	1641083
QTE C	Blue	Single OH R 1/8	1650278
POIDS A NUM	Blue	Single OH R 1/8	1650279
PRIX BPASSE	Blue	Single OH R1/8	1650281
BOUCA	Red	Single OH Std	1650284
BON RED PRODUCT N	Red	Single OH Std	1650314
ANNUL J	Red	Single OH Std	1650315
REMB D	Red	Single OH Std	1641316
REMISE K	Red	Single OH Std	1650317
NON VENTE+	White	Single OH Std	1650319
TABAC	Brown	Single OH R 1/8	1650360
NON-ALIM	Brown	Single OH R 1/8	1650400
CONSIGNE	Blue	Single OH R 1/8	1650447
REMB CONSIGNE	Red	Single OH R 1/8	1650448
EIPCERIE TAXEE	White	Single OH R 1/8	1650449
EIPCERIE SS TAXE	White	Single OH R 1/8	1650450
TARE	Blue	Single OH Std	1855267
MODIF ENTREE	Blue	Single OH Std	5183520
PROD LAIT	White	Single OH R 1/8	5192934
PROD CONG	Blue	Single OH Std	5192935
CIDRE	Brown	Single OH R 1/8	5192936
SANTE	White	Single OH R 1/8	5192937
MARCH GEN	Green	Single OH R 1/8	5192938
PLANTES	Green	Single OH R 1/8	5192939
MENUS	Brown	Single OH R 1/8	5192940
FROMAGE	Yellow	Single OH R 1/8	5192941
BIERE	Yellow	Single OH R 1/8	5192943
FRUIT LEG	Green	Single OH R 1/8	5192944
ARGENT	Blue	Single OH Std	5192945
BON	Blue	Single OH Std	5192946
TIMBRE	Blue	Single OH Std	5192947
FRAIS CHEQUE	Blue	Single OH R 1/8	5192948
TAXE/SS TAXE	Blue	Single OH Std	5192949
CERTIF CADEAU	Red	Single OH Std	5192951
BOUL	White	Single OH R 1/8	5192952
POISSON	White	Single OH R 1/8	5192953
CHARC	Yellow	Single OH R 1/8	5192955
ENTREE	White	Double TV R 1/8	1650337
EPIC	White	Double TV R 1/8	1650339
EFFAC	White	Double TV R 1/8	5192954

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
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France:					
REMISE K	Blue	Single	OH	Std	1641001
NON VENTE	Blue	Single	OH	Std	1641014
EXCEPT	Blue	Single	OH	Std	1641015
OUVERT PERM	Blue	Single	OH	Std	1641016
BON RED PRODUCT N	Blue	Single	OH	Std	1641017
ANNUL J	Blue	Single	OH	Std	1641019
DIVERS H	Blue	Single	OH	Std	1641020
ESPECES G	Blue	Single	OH	Std	1641021
REMB	Blue	Single	OH	Std	1641023
E	Blue	Single	OH	Std	1641026
PROD FRAIS	Green	Single	OV	Std	1641050
BOUCH	Red	Single	OV	Std	1641051
EPIC	Blue	Single	OV	Std	1641057
VERIF CHEQUE 1	Blue	Single	OH	Std	1641065
CHEQUE F	Blue	Single	OH	Std	1641069
QTE C	Blue	Single	OH	Std	1641083
RAYON 1	Blue	Single	OV	Std	1645064
RAYON 2	Blue	Single	OV	Std	1645065
RAYON 3	Blue	Single	OV	Std	1645066
RAYON 4	Blue	Single	OV	Std	1645067
RAYON 5	Blue	Single	OV	Std	1645068
RAYON 6	Blue	Single	OV	Std	1645069
QTE C	Blue	Single	OH	R 1/8	1650278
POIDS A NUM	Blue	Single	OH	R 1/8	1650279
PRIX BPASSE	Blue	Single	OH	R 1/8	1650281
FOOD PRAIS	Green	Single	OH	R 1/8	1650283
BOUCH	Red	Single	OH	R 1/8	1650284
M	Red	Single	OH	Std	1650305
BON RED PRODUCT N	Red	Single	OH	Std	1650314
ANNUL J	Red	Single	OH	Std	1650315
REMB D	Red	Single	OH	Std	1650316
REMISE K	Red	Single	OH	Std	1650317
NON VENTE +	White	Single	OH	Std	1650319
RAYON 2	White	Single	OH	R 1/8	1650370
ENTREE	White	Single	OV	Std	1650371
ENTREE	White	Single	OH	R 1/8	1650372
EPIC	White	Single	OH	R 1/8	1650373
RAYON 3	Yellow	Single	OH	R 1/8	1650374
RAYON 4	Green	Single	OH	R 1/8	1650375
RAYON 3	Red	Single	OH	R 1/8	1650376
CONSIGNE	Blue	Single	OH	R 1/8	1650447
REMB CONSIGNE	Red	Single	OH	R 1/8	1650448
EPICERIE TAXEE	White	Single	OH	R 1/8	1650449
EPICERIE SS TAXE	White	Single	OH	R 1/8	1650450
TARE	Blue	Single	OH	R 1/8	1762477
POIDS A NUM	Blue	Single	OH	Std	1854847
PRIX B PASSE	Blue	Single	OH	Std	1854848
TARE	Blue	Single	OH	Std	1855267
M	Blue	Single	OH	Std	1855424
MODIF ENTREE	Blue	Single	OH	Std	5183520
ENTREE	White	Double	TV	R-1/8	1650337
REST CLAVIER	White	Double	TV	R-1/8	1650338
EPIC	White	Double	TV	R-1/8	1650339

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
Germany:					
BAR G	Blue	Single	OH	Std	1641024
SHECK F	Blue	Single	OH	Std	1641025
VERGUT D	Blue	Single	OH	Std	1641027
MENGE C	Blue	Single	OH	Std	1641028
PREIS B (CODE)	Blue	Single	OH	Std	1641029
GEWICHT A (K#)	Blue	Single	OH	Std	1641030
NACHL K	Blue	Single	OH	Std	1641035
STORNO J	Blue	Single	OH	Std	1641036
BEGINN ENDE	Blue	Single	OH	Std	1641038
KEIN VERKAUF	Blue	Single	OH	Std	1641041
RABATT MARKEN	Blue	Single	OH	Std	1641042
DIV ART	Green	Single	OH	Std	1641043
OBST GEM	Blue	Single	OH	Std	1641045

## MACHINES

ABT .1	Blue	Single	OV	Std	1644975
ABT .2	Blue	Single	OV	Std	1644976
ABT .3	Blue	Single	OV	Std	1644977
ABT .4	Blue	Single	OV	Std	1644978
BACKM	Blue	Single	OH	Std	1644979
DELIK	Blue	Single	OH	Std	1644980
MILCH PROD.	Blue	Single	OH	Std	1644981
TIEFK KOST	Blue	Single	OH	Std	1644982
SPIRIT	Blue	Single	OH	Std	1644983
WEIN	Blue	Single	OV	Std	1644984
DROG	Blue	Single	OV	Std	1644985
TABAK	Blue	Single	OV	Std	1644986
GE-BUHR	Blue	Single	OV	Std	1644987
FISCH	Blue	Single	OV	Std	1644988
BLU-MEN	Blue	Single	OV	Std	1644989
VER-SCH.	Blue	Single	OV	Std	1644990
KASE	Blue	Single	OV	Std	1644991
BIER	Blue	Single	OV	Std	1644992
MILCH PROD	White	Single	OH	R-1/8	1644554
EIGEN COUPON M	Red	Single	OH	Std	1650276
MENGE C	Blue	Single	OH	R-1/8	1650285
GEWICHT A (K#)	Blue	Single	OH	R-1/8	1650286
AND ZAHLUNG H	Blue	Single	OH	Std	1650287
PREIS B (CODE)	Blue	Single	OH	R-1/8	1650288
SONDER COUPON E	Blue	Single	OH	R-1/8	1650289
SPIRIT	Brown	Single	OH	R-1/8	1650290
DELIK	Yellow	Single	OH	R-1/8	1650291
BACKW	White	Single	OH	R-1/8	1650292
OBST GEM	Green	Single	OH	R-1/8	1650293
WURST FLSC	Red	Single	OH	R-1/8	1650294
TIEFK KOST	Green	Single	OH	R-1/8	1650295
KEIN VERKAUF+	White	Single	OH	Std	1650296
SONDER COUPON E	Blue	Single	OH	Std	1650297
NACHL K	Red	Single	OH	Std	1650298
VERGUT D	Red	Single	OH	Std	1650299
STOENO J	Red	Single	OH	Std	1650300
FREMD COUPON N	Red	Single	OH	Std	1650301
PFAND	Blue	Single	OH	R-1/8	1650329
PFND-GUTSCHR	Red	Single	OH	R-1/8	1650330
DIV. ART M. ST.	White	Single	OH	R-1/8	1650331
DIV. ART O. ST.	White	Single	OH	R-1/8	1650332
DROG	White	Single	OH	R-1/8	1650377
FISCH	White	Single	OH	R-1/8	1650378
ABT .2	White	Single	OH	R-1/8	1650379
EINGABE	White	Single	OH	Std	1650380
EINGABE	White	Single	OH	R-1/8	1650381
DIV ART	White	Single	OH	R-1/8	1650382
VER-SCH.	Brown	Single	OH	R-1/8	1650383
TABAK	Brown	Single	OH	R-1/8	1650384
BIER	Yellow	Single	OH	R-1/8	1650385
ABT .3	Yellow	Single	OH	R-1/8	1650386
KASE	Yellow	Single	OH	R-1/8	1650387
ABT .4	Green	Single	OH	R-1/8	1650388
BLU-MEN	Green	Single	OH	R-1/8	1650389
ABT .1	Red	Single	OH	R-1/8	1650390
WEIN	Red	Single	OH	R-1/8	1650391
GE-BUHR	Blue	Single	OH	R-1/8	1650392
TARA	Blue	Single	OH	R-1/8	1650409
EIGEN COUPON M	Blue	Single	OH	Std	1752518
WURST FLSC	Red	Single	OV	Std	1854841
KREDIT PRUFUNG 1	Blue	Single	OH	Std	1854843
FREMD COUPON N	Blue	Single	OH	Std	1854846
NON-FOOD	Blue	Single	OV	Std	1855391
TARA	Blue	Single	OH	Std	5183528
EINGABE ANDERN	Blue	Single	OH	Std	5183835
EINGABE	White	Double	TV	Std	1650258
SUMME	White	Double	TV	Std	1650282
SUMME	White	Double	TV	R-1/8	1650340
EINGABE	White	Double	TV	R-1/8	1650341
LOSCHEN	White	Double	TV	R-1/8	1650342
DIV ART	White	Double	TV	R-1/8	1650343
LOSCHEN	White	Double	OV	Std	1641075

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
Italy:					
BOLLINI -	Blue	Single	OH	Std	1641002
INIZIO/FINE CASSA	Blue	Single	OH	Std	1641003
BUONI PROD N	Blue	Single	OH	Std	1641004
SCONTO K	Blue	Single	OH	Std	1641006
ANNULL J	Blue	Single	OH	Std	1641007
VARIE H	Blue	Single	OH	Std	1641008
ASSEGNO F	Blue	Single	OH	Std	1641009
RESO D	Blue	Single	OH	Std	1641011
QUANT C	Blue	Single	OH	Std	1641012
E	Blue	Single	OH	Std	1641026
CARNE	Red	Single	OV	Std	1641047
SCATOL	Blue	Single	OV	Std	1641056
VERIF ASSEGNO 1	Blue	Single	OH	Std1641073	
CONT G	Blue	Single	OH	Std	1641089
APRE CASSA +	Blue	Single	OH	Std1641090	
ORTO-FRUT	Green	Single	OV	Std1641092	
REP 1	Blue	Single	OV	Std	1644993
REP 2	Blue	Single	OV	Std	1644994
REP 3	Blue	Single	OV	Std	1644995
REP 4	Blue	Single	OV	Std	1644996
PANE	Blue	Single	OV	Std	1644997
DOLCI	Blue	Single	OV	Std	1644998
LATT.	Blue	Single	OV	Std	1644999
CIBI SURG.	Blue	Single	OV	Std1645000	
VINI	Blue	Single	OV	Std	1645001
COSM	Blue	Single	OV	Std	1645002
GEN VARI	Blue	Single	OV	Std	1645003
PESCE	Blue	Single	OV	Std	1645004
FIORI	Blue	Single	OV	Std	1645005
MINUT.	Blue	Single	OV	Std	1645006
FORM.	Blue	Single	OV	Std	1645007
NON-ALIM.	Blue	Single	OV	Std	1645008
BIRRA	Blue	Single	OV	Std	1645009
CARNE	Red	Single	OH	R-1/8	1650264
QUANT C	Blue	Single	OH	R-1/8	1650266
PESO A (OPER)	Blue	Single	OH	R-1/8	1650267
PREZZO B (COD)	Blue	Single	OH	R-1/8	1650269
E	Blue	Single	OH	R-1/8	1750271
DOLCI	Yellow	Single	OH	R-1/8	1650272
PANE	White	Single	OH	R-1/8	1650273
LATT.	White	Single	OH	R-1/8	1650274
ORTO-FRUT	Green	Single	OH	R-1/8	1650275
CIBI SORG.	Green	Single	OH	R-1/8	1650277
APRE CASSA +	White	Single	OH	Std	1650302
SCONTO K	Red	Single	OH	Std	1650304
M	Red	Single	OH	Std	1650305
RESO D	Red	Single	OH	Std	1650306
ANNULL J	Red	Single	OH	Std	1650307
BUONI PROD N	Red	Single	OH	Std	1650308
DEPOS. VUOTO	Blue	Single	OH	R-1/8	1650327
RESO DEPOS.	Red	Single	OH	R-1/8	1650328
COSM.	White	Single	OH	R-1/8	1650393
PESCE	White	Single	OH	R-1/8	1650394
REP 2	White	Single	OH	R-1/8	1650395
REGISTR	White	Single	OH	Std	1650396
REGISTR	White	Single	OH	R-1/8	1650397
SCATOL	White	Single	OH	R-1/8	1650398
MINUT.	Brown	Single	OH	R-1/8	1650399
NON-ALIM.	Brown	Single	OH	R-1/8	1650400
BIRRA	Yellow	Single	OH	R-1/8	1650401
REP 3	Yellow	Single	OH	R-1/8	1650402
FORM.	Yellow	Single	OH	R-1/8	1650403
GEN. VARI	Green	Single	OH	R-1/8	1650404
REP 4	Green	Single	OH	R-1/8	1650405
FIORI	Green	Single	OH	R-1/8	1650406
REP 1	Red	Single	OH	R-1/8	1650407
VINI	Red	Single	OH	R-1/8	1650408
TARA	Blue	Single	OH	R-1/8	1650409
PESO A (OPER)	Blue	Single	OH	Std	1854838

## MACHINES

PREZZO B (COD)	Blue	Single	OH	Std	1854839
LIQUOR	Blue	Single	OV	Std	1855381
M	Blue	Single	OH	Std	1855424
TARA	Blue	Single	OH	Std	5183528
IMSS ALTERNA	Blue	Single	OH	Std	5183545
REGISTR	White	Double	TV	Std	1650268
TOTALE	White	Double	TV	Std	1650270
REGISTR	White	Double	TV	R-1/8	1650333
TOTALE	White	Double	TV	R-1/8	1650334
AZZER	White	Double	TV	R-1/8	1650335
SCATOL	White	Double	TV	R-1/8	1650336

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
Spain:					
E	Blue	Single	OH	Std	1641026
CARNE	Red	Single	OV	Std	1641047
COMES TIBLES	Blue	Single	OV	Std	1641048
REINT D	Blue	Single	OH	Std	1641052
CANT C	Blue	Single	OH	Std	1641053
PESO A (#OP)	Blue	Single	OH	Std	1641055
DESC K	Blue	Single	OH	Std	1641058
CANC J	Blue	Single	OH	Std	1641059
VARIOS H	Blue	Single	OH	Std	1641060
EFTVO G	Blue	Single	OH	Std	1641061
IDENT/FIN	Blue	Single	OH	Std	1641062
Cupon FAB N	Blue	Single	OH	Std	1641063
VERIF CHEQUE 1	Blue	Single	OH	Std	1641065
SELLO -	Blue	Single	OH	Std	1641066
NO VENTA +	Blue	Single	OH	Std	1641067
CHEQUE F	Blue	Single	OH	Std	1641069
DPT 01	Blue	Single	OV	Std	1645010
DPT 02	Blue	Single	OV	Std	1645011
OPT 03	Blue	Single	OV	Std	1645012
DPT 04	Blue	Single	OV	Std	1645013
PAN	Blue	Single	OV	Std	1645014
REPO	Blue	Single	OV	Std	1645015
LACT	Blue	Single	OV	Std	1645016
PROD CONG	Blue	Single	OV	Std	1645017
LICOR	Blue	Single	OV	Std	1645018
VINO	Blue	Single	OV	Std	1645019
PERF	Blue	Single	OV	Std	1645020
TABAC	Blue	Single	OV	Std	1645021
MERC GEN	Blue	Single	OV	Std	1645022
VERIF IMPT	Blue	Single	OV	Std	1645023
PESC	Blue	Single	OV	Std	1645024
FLOR	Blue	Single	OV	Std	1645025
VAR	Blue	Single	OV	Std	1645026
QUESO	Blue	Single	OV	Std	1645027
NO ALIM	Blue	Single	OV	Std	1645028
CERV	Blue	Single	OV	Std	1645029
PESO A (#OP)	Blue	Single	OH	R-1/8	1650255
PRECIO B CLAVE	Blue	Single	OH	R-1/8	1650257
LICOR	Brown	Single	OH	R-1/8	1650259
REPO	Yellow	Single	OH	R-1/8	1650260
PAN	White	Single	OH	R-1/8	1650261
LACT	White	Single	OH	R-1/8	1650262
CARNE	Red	Single	OH	R-1/8	1650264
PROD CONG	Green	Single	OH	R-1/8	1650265
E	Blue	Single	OH	R-1/8	1650271
NO VENTA +	White	Single	OH	Std	1650309
DESC K	Red	Single	OH	Std	1650311
REINT D	Red	Single	OH	Std	1650312
CANC J	Red	Single	OH	Std	1650313
CURON FAB N	Red	Single	OH	Std	1650320
PAGO ENVASE	Blue	Single	OH	R-1/8	1650321
DEV ENVASE	Red	Single	OH	R-1/8	1650322
IMPTO COMEST	White	Single	OH	R-1/8	1650323
CEMEST NO IMP	White	Single	OH	R-1/8	1650324
PERF	White	Single	OH	R-1/8	1650352
PESC	White	Single	OH	R-1/8	1650353
DPT 02	White	Single	OH	R-1/8	1650354

## MACHINES

INTRO	White	Single	OH	Std	1650355
INTRO	White	Single	OH	R-1/8	1650356
COMES TIBLES	White	Single	OH	R-1/8	1650357
VAR	Brown	Single	OH	R-1/8	1650358
NO ALIM	Brown	Single	OH	R-1/8	1650359
TABAC	Brown	Single	OH	R-1/8	1650360
CERV	Yellow	Single	OH	R-1/8	1650361
DPTO 3	Yellow	Single	OH	R-1/8	1650362
QUESO	Yellow	Single	OH	R-1/8	1650363
MERC GEN	Green	Single	OH	R-1/8	1650364
DPTO 4	Green	Single	OH	R-1/8	1650365
FLOR	Green	Single	OH	R-1/8	1650366
DPTO 1	Red	Single	OH	R-1/8	1650367
VINO	Red	Single	OH	R-1/8	1650368
VERIF IMPT	Blue	Single	OH	R-1/8	1650369
TARA	Blue	Single	OH	R-1/8	1650409
PRECIO B CLAVE	Blue	Single	OH	Std	1854849
M	Blue	Single	OH	Std	1855424
ALTERAR FUNCTION	Blue	Single	OH	Std	5183516
TATA	Blue	Single	OH	Std	5183528
INTRO	White	Double	TV	Std	1650256
INTRO	White	Double	TV	R-1/8	1650344
BORRAR	White	Double	TV	R-1/8	1650345
COMES TIBLES	White	Double	TV	R-1/8	1650346

NAME	COLOR	SIZE	VERSION	HEIGHT	P/N
United Kingdom:					
1/2	White	Square	OH-CM	Std	1641000
E	Blue	Single	OH	Std	1641026
CHEQUE VERIFY 1	Blue	Single	OH	Std	1641068
CHEQUE F	Blue	Single	OH	Std	1641069
SPIRIT	Blue	Single	OV	Std	1644983
CHEQUE	Blue	Single	OV	Std	1645063
E	Blue	Single	OH	R-1/8	1650271
SPIRIT	Brown	Single	OH	R-1/8	1650290
M	Red	Single	OH	Std	1650305
TAX	White	Single	OH	R-1/8	1650325
NON TAX	White	Single	OH	R-1/8	1650326
CHEQUE	Blue	Single	OH	R-1/8	1650410
ENTER	White	Single	OH	Std	1762467
TARE	Blue	Single	OH	R-1/8	1762477
DEPT 1	Red	Single	OH	R-1/8	1762483
DEPT 4	Green	Single	OH	R-1/8	1762486
ENTER	White	Single	OH	R-1/8	1762500
DEPT 2	White	Single	OH	R-1/8	1762501
M	Blue	Single	OH	Std	1855424
M*	Blue	Single	OH	Std	5995643
O	White	Long	TH	Std	1648416

**Blank Keytops:** The following is a list of blank keytops which are available for customer engraving:

NAME	COLOR	SIZE	VERSION	HEIGHT	PART NO.
(all	White	Square	OH-CM	R-1/8	1648413**
blank)	White	Square	OH-CB	Std	1752491**
	White	Square	OH	Std	1853928**
	White	Square	OH-B	Std	1853930**
	White	Square	OH-CM	Std	1854184**
	White	Square	OH-C	Std	1854185**
	White	Single	OVH	Std	1762468**
	Yellow	Single	OVH	Std	1762469**
	Black	Single	OVH	Std	1762470**
	Brown	Single	OVH	Std	1762471**
	N-M Br	Single	OVH	Std	2688797**
	White	Single	OH	R-1/8	1762506**
	Red	Single	OH	R-1/8	1762507**
	Blue	Single	OH	R-1/8	1762508**
	Green	Single	OH	R-1/8	1762509**
	Yellow	Single	OH	R-1/8	1762510**

## MACHINES

Black	Single	OH	R-1/8	1762511**
Brown	Single	OH	R-1/8	1762512**
White	Single	OH	R-1/4	1762513**
Red	Single	OH	R-1/4	1762514**
Blue	Single	OH	R-1/4	1762515**
Green	Single	OH	R-1/4	1762516**
Yellow	Single	OH	R-1/4	1762517**
Black	Single	OH	R-1/4	1762518**
Brown	Single	OH	R-1/4	1762519**
Blue	Single	OVH	Std	1853914**
Green	Single	OVH	Std	1854182**
Red	Single	OVH	Std	1854183**
White	Long	TH	R-1/8	1648415**
White	Long	TH	Std	1648417**
Red	Double	TV	R-1/4	1648405**
Blue	Double	TV	R-1/4	1648406**
Green	Double	TV	R-1/4	1648407**
Yellow	Double	TV	R-1/4	1648408**
Black	Double	TV	R-1/4	1648409**
Brown	Double	TV	R-1/4	1648410**
White	Double	TV	Std	1762522**
Red	Double	TV	Std	1762523**
Blue	Double	TV	Std	1762524**
Green	Double	TV	Std	1762525**
Yellow	Double	TV	Std	1762526**
Black	Double	TV	Std	1762527**
Brown	Double	TV	Std	1762528**
White	Double	TV	R-1/8	1762533**
Red	Double	TV	R-1/8	1762534**
Blue	Double	TV	R-1/8	1762535**
Green	Double	TV	R-1/8	1762536**
Yellow	Double	TV	R-1/8	1762537**
Black	Double	TV	R-1/8	1762538**
Brown	Double	TV	R-1/8	1762539**
White	Double	TV	R-1/4	1762540**
N-M Br	Double	TV	Std	2688798**

**Universal Keytops:** Keyboard accessories are available which allow the customer to define and to change the messages on the keytops on the 3683 Point of Sale terminal (and the 3684 Point of Sale control unit). These accessories consist of legendar keytops and sheets of blank labels to use on these keytops.

The universal keytops come in the four standard sizes and in two heights. They consist of two parts: a white bottom button and a

clear plastic cover. Blank labels for the various keytop sizes may also be ordered. These labels come in various colors and may be printed with either black or white ink. The user may define unique key button messages, print these messages on the desired color label, affix the printed color label to the white bottom key button and snap on the clear protective cover. Extra clear plastic covers are also available for use as spares.

ITEM	COLOR	SIZE	VERSION	HEIGHT	P/N
Keytop	White	Square	OH	Std	5188767**
Keytop	White	Single	OVH	Std	5188768**
Keytop	White	Single	OH	R-1/8	5188769**
Keytop	White	Long	TH/TV	Std	1642499**
Keytop	White	Double	TV	Std	5188774**
Keytop	White	Double	TV	R-1/8	8627316**
Cover	Clear	Square	--	--	5188751**
Cover	Clear	Single	--	--	5188754**
Cover	Clear	Long	--	--	5188757**
Cover	Clear	Double	--	--	5188760**

ITEM	COLOR	SIZE	DECALS/SHEET	P/N
Labels	White	Square	102 decals/sheet	5194900
Labels	White	Single	68 decals/sheet	1756848
Labels	Yellow	Single	68 decals/sheet	5194901
Labels	Red	Single	68 decals/sheet	5194902
Labels	Blue	Single	68 decals/sheet	5194903
Labels	Green	Single	68 decals/sheet	5194904
Labels	Brown	Single	68 decals/sheet	5194905
Labels	White	Long	42 decals/sheet	5194906
Labels	White	Double	28 decals/sheet	5194907

Labels	Red	Double	28 decals/sheet	5194908
Labels	Blue	Double	28 decals/sheet	5194909

**Key Stops (P/N 1650058):** \*\* The key stop is a small ring collar which is placed over the stem of a keybutton and under the keytop. The collar holds the keytop in the up position and prevents its use.

**Keytop Extractor (P/N 1647720):** The keytop extractor is a small plier-like device which fits between rows of keybuttons. By squeezing on the handles, a firm grip is made on the keytop and it may be pulled off its stem. The customer may find this helpful when adding key stops, universal keytops, or in doing any rearranging of the keyboard.

Two keytop extractors are supplied with each 3651 controller. The customer may desire additional extractors.

**Locks and Keys:** The 3683 is equipped with a cash drawer lock and can be equipped with an optional journal lock #4690 and optional Manager Keylock #4905. In addition, the 3684 has an optional Diskette Cover Lock. The cash drawer lock and all other locks ordered will be shipped with two keys. The cash drawer lock, journal lock, manager lock, and diskette cover lock will be randomly selected unless specified otherwise (see "Special Features"). If the customer wishes to replace a unique lock, the order should state the 3683 machine serial number, lock name and the lock identification number (stamped on lock).

**Note:** Without an identification number, the order should state machine serial number, lock name and the words "NEW LOCK REQUIRED". Additional or replacement keys may be purchased from a local locksmith or from IBM Locks may be purchased from IBM and may be changed in the field. The following randomly selected locks (with two keys) may be ordered by P/N:

	P/N
3683/3684 Cash Drawer Lock	8543351
3683/3684 Journal Lock	8543620
3683/3684 Manager Lock	8547992
3684 Diskette Cover Lock	8543620

When ordering key blanks from a local locksmith or Hudson Lock, Inc., specify the Hudson Blank Number as follows:

IBM	Hudson
Lock Serial Number	Blank Key Number
IB101M THRU IB210M	KBYI10
IBM326 THRU IBM350	KBYL01
IBM426 THRU IBM525	KBYL02

Hudson Lock Inc., Sales Dept.  
81 Apsley Street  
Hudson, Massachusetts 01749

**Loop Accessories:** Female Loop Connector (P/N 5162880): The Female Loop Connectors will be used in all positions of the 3650 and 3680 Store Loops where terminals will potentially be installed. The corresponding male connector will either be the plug provided on each terminal or, in the case of the loop position currently not occupied by a terminal, the Loop Shorting Plug (see below).

**Loop Shorting Plug (P/N 1860198):** The Loop Shorting Plug will be used in all 3650 and 3680 Store Loop Positions that are not occupied by terminals. See "3650 Physical Planning Manual", GA27-3074, or "3680 Site Planning Guide" for details.

**Store Loop Polarity Tester (P/N 1859559):** \*\* The Store Loop Polarity Tester is used by the customer to check Loop wiring prior to installing 3650 and 3680 systems. One is provided at N/C for each controller site. Refer to the 3651 or 3684 "Specify" section of the sales manual. For details, see "3650 Physical Planning Manual", GA27-3074, or "3680 Site Planning Guide".

**Magnetic Slot Reader (P/N 4123500 or RPQ 7B0563):** The Magnetic Slot Reader (MSR) attaches by a 1.5m (4ft.11in.) cable to a number of data entry and reporting devices that have an appropriate magnetic adapter feature. This slot reader accommodates a wide range (height and length) of magnetic striped card stock and plastic badges including: Magnetic striped 80-column cards, operator identification badges, large and small credit cards.

The MSR has three lights and an audible buzzer which provide feedback to the user on the status of scanned data. Holes in the bottom of the MSR allow optional attachment to an appropriate flat surface. The MSR has a wide opening on one end to facilitate reading of badges or documents. A magnetic reader attachment feature (RPQ 7B0560) on the appropriate machine is required to use the MSR. To order the MSR via Machine Order, for delivery with the 3683/3684, RPQ 7B0563 should be ordered. MES orders for the MSR should order P/N 4123500.

**Maintenance:** High densities of hard particulates may decrease MSR head life. In this environment, the customer should consider protecting the media to reduce the frequency of head assembly replacement. Where there are high densities of corrosive gases, more frequent head assembly replacement may be required. There is no regularly scheduled preventative maintenance recommended by IBM. Primary maintenance for the Magnetic Readers will be done by the customer following the problem determination and part replacement procedures.

The following are a recommended number of spare readers which the customer may want to consider stocking:

Readers	Spares
50	2
100	3
150	4
200	5

**Warranty:** The Magnetic Reader Accessories are warranted free from defects in workmanship and materials for 90 days. In countries other than Canada, warranty service for the Magnetic Scanners will be performed by the CE. In Canada, warranty service for the Magnetic Scanners will be performed at the Repair Center. The customer will fill out a Repair Center Machine Repair Authorization Form #2110, pack and mail it and the defective Scanner to:

IBM Canada Ltd.  
Canadian Distribution Center  
Dept. 415  
75 Barber Green Road  
Don Mills, Ontario M3C 1H7

Optionally, the customer can obtain post-warranty maintenance on a Time and Material basis from CE other than Canada. In Canada, optional IBM maintenance is available on a time and materials basis at the Repair Center. Authorization Form #2110 applies.

**Note:** A Magnetic Reader attachment feature RPQ 7B0560 is required to use the Magnetic Slot Reader.

## SUPPLIES

**Ribbons:** A black ribbon cartridge, P/N 7034640 or equivalent, is required.

**Paper:** Roll paper 88.9mm (3.5 in.) diameter, 69.85mm (2.75 in.) wide is required at the cash receipt and journal print stations.

Contact IBM.

## 3684 POINT-OF-SALE CONTROL UNIT

### PURPOSE

A user-programmable input/output, data collection and processing terminal with a 985,088 byte integrated diskette for the 3680 Programmable Store System. Model 1 of the 3684 is designed for single terminal stores. The 3684 model 1 contains a single programmable segment with appropriate features to allow the user to perform the point-of-sale, data collection, credit authorization, price look-up, inquiry, data entry and host communication functions. The point-of-sale features and functions are similar to the 3683 Point-of-Sale Terminals.

Model 2 of the 3684 is designed to perform the Point of Sale function and to act as a master control in multiple terminal stores. There are two self-contained programmable segments, one to perform the point-of-sale function similar to the 3683, and the second to perform the control function for communication with its own point-of-sale segment and with additional loop-attached 3683 (models 1, 2 or 3) terminals. In addition, the control segment controls the diskette and host communication input/output functions.

### MODELS 1, 2

**Model 1 001:** Single unit

**Model 2 002:** Master unit

#### Prerequisites:

1. A 3704, 3705 or 3725 in 2701, 2703 Emulation Mode (or Integrated Communications Adapter) for BSC system and in NCP/VIS mode for SDLC systems (with appropriate features ... see M3704, 3705 and 3725 pages) attached to any virtual storage S/370 or 4300 processor.
2. A keyboard (#2712 or #2713) and a display (#3331, #3332, #3346 or #3348) must be ordered for each 3684.
3. A 3720 in 2701, 2703 Emulation Mode for BSC system and in ACF/NCP Mode for SDLC system attached to any virtual storage 4341, 4361, 4381, 303X, 308X or 3090 processor.

### HIGHLIGHTS

A modular input/output unit with features that provide for an integrated or a limited distributed (cash drawer and display) package. It features data entry by keyboard or from a magnetic, non-IBM EAN/UPC, or non-IBM OCR hand-held reader and data output by an 8-digit numeric display, with up to 32 indicators for operator guidance and machine status conditions, or an alphameric display with 36 character positions and printing of input or output data under program control. It features a cash drawer with removable till and adjustable divider option. An integrated diskette is used for customer program storage, data and table storage, diagnostic programs and error logging. The minimum configuration must include a base unit plus a keyboard and a display. (See "Prerequisites".)

**Base Unit:** Consists of (1) programmable segments and storage (56K for mdl 1; mdl 2 has 32K for the point-of-sale segment and 56K for the control segment.); (2) a matrix printer with a cash receipt station; and (3) a 985,088 byte diskette drive. An audible alarm, activated when predetermined events require operator attention or intervention for system operation, is also part of the base unit.

**Printer:** A matrix, bidirectional printer which prints a 38-character print line at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. It uses an easily replaceable cartridge ribbon. In addition to the standard character sets, an all-points addressable capability allows (by customer programming) printing of logos and special graphics including Kanji. Additional print stations can be

ordered by special feature. The cash receipt station will accept 88.9mm (3.5") diameter roll paper, 69.85mm (2.75 in.) wide.

**Diskette:** A 985,088 byte Diskette 2D is used on both mdls. The diskettes are formatted to 256 byte blocks. The diskette is removable and interchangeable.

**Communications:** All 3684 mdls may have BSC or SDLC communication capability. Depending on customer selection at system generation, either or both protocols may reside in the terminal and either may become active when loaded from the diskette.

**System Attachment:** The 3684 mdls 1 and 2 attach to any virtual storage S/370 or 4300 processor via a 3704, 3705, 3720 or 3725 Communications Controller in 2701, 2703 Emulator Mode (or Integrated Communications Adapter) for BSC systems and in NCP/VIS mode for SDLC systems. Attachment is over communication lines at speeds of 600, 1200, 2400 or 4800 bps. The 3684 has the capability of concurrent host communication and point-of-sale function, which allows store operations to continue when transmitting or receiving data from the host processor.

The 3684 mdl 1 and 2 can communicate with the 8100 System over nonswitched communication facilities using SDLC, and with the Series/1 over switched, nonswitched point-to-point or multipoint facilities using BSC. The Host Command Processor (HCP) Facility in the 3684 can communicate with a user program in the 8100 executing at the Data Stream Interface, or with a user program in the Series/1 using Read/Write support of the Realtime Programming System. A user-written program in the 3684 can communicate with a user program in the 8100 at the DSI level or in the DPPX/DTMS environment, or with a user program in the Series/1 using RPS Read/Write communications support.

**Communications Facilities:** The 3684 operates in data half-duplex point-to-point or multipoint mode on half-duplex or duplex facilities at transmission speeds of 1200/600, 2400/1200, 4800/2400 bps on nonswitched facilities. In addition, the 3684 also operates in half-duplex point-to-point mode at transmission speeds of 1200/600, 2400/1200 and 4800/2400 bps on switched facilities. See M2700 pages.

**Modems:** A 1200 bps Integrated Modem feature (#5530) or an external modem may be attached to a 3684. External modems require the External Modem Interface feature (#3701).

Modems	Speed (bps)	Lines
3833-1	2400	Nonsw voice grade
3834-1	4800	Nonsw voice grade
3863-1,2	2400/1200	Nonsw or Sw voice grade
3864-1,2	4800/2400	Nonsw or Sw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3872-1	2400/1200	Nonsw or Sw voice grade
3976-3	1200/600	Nonsw or Sw voice grade
5811-10	2400/4800/ 9600	Limited distance modem
5811-18		Rack mount version of mdl 10
5811-20	2400/4800/ 7200/9600	Nonsw baseband Rack mount version of mdl 20
5811-28		
5812-10	2400/4800/ 7200/9600	Nonsw baseband
5812-18		Rack mount version

## MACHINES

of mdl 10

**Note:** 4-wire Switched Network Backup is available on 3683, and 3684 modems with feature #7953 installed.

Switched network backup mode of operation is possible using an appropriately featured external modem. For communications capabilities, product utilization and special features, see M2700, 3683, 3684, 3672 pages.

**In-Store Communications:** The 3684 mdl 2 performs a master control function for 3683s that are attached to the 3684 by a 2400 or 4800 bps loop. Interactive communication capability exists between the 3684 and 3683s for data collection, price look-up, credit, and diagnostic facilities. All mdls of the 3684 receive their initial machine load (IML) from a S/370 or 4300 host processor either by physical diskette transport or by teleprocessing. The 3684 IML and the IMLs for 3683s associated with a 3684 mdl 2 are maintained on the diskette. The 3684 mdl 2 transmits the 3683 IML when requested by the 3683.

**Limitations:** The 3684 mdl 2 has a limited number of optional feature positions available to the customer. If Storage Expansion-POS (#6991) is required by your customer, then a maximum of two feature positions are available. When selecting the features to be installed, the sum of their unit values should not exceed 2 and specify code #9444 should be indicated. If Storage Expansion-POS (#6991) is not required, then a maximum of four feature positions are available. When selecting the features to be installed, the sum of their unit values should not exceed 4 and specify code #9445 should be indicated.

If your customer does not initially install Storage Expansion-POS (#6991) and specifies #9445 to provide additional feature capability and decides after installation that he required Storage Expansion-POS (#6991), then the feature capability provided by #9445 will have to be replaced at customer expense. When this occurs you must recalculate the unit value to ensure you have not exceeded a sum total of 2.

Feature	Unit Value
Non-IBM Coin Dispenser Adapter (#5431)	1
Non-IBM Scale Adapter (#5433)	1
*Non-IBM OCR Hand-Held Reader Adapter (#5422)	1
*Magnetic Wand Reader (#4945)	1
IML Write Adapter (#4634)	1
*Non-IBM EAN/UPC Wand Attachment (#4946)	2

\* = Mutually Exclusive

See RPQ 8Q0322 for additional feature position configurations applicable to the External Storage Attachment Feature #4500.

**Customer Responsibilities:** See S3680 pages for general description of customer responsibilities.

**Proposal/Acknowledgement Letter Statements:** Each proposal and acknowledgement letter must include the following statement:

"It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 3684 which contains cash or other valuables. It will be the customers' responsibility to remove, control and replace cash so that IBM can fulfill its warranty and maintenance obligations.

When a failure occurs in the cash drawer of any 3684 and it cannot be opened prior to maintenance by IBM, the Customer will assign one of its personnel to assume responsibility for removal of the cash or other valuables when the drawer is opened."

**Customer Setup:** The 3684 will be shipped with customer setup instructions. The customer is responsible for:

- Unpacking, placement, set up and checkout of the 3684 at time of delivery, or when relocating the 3684.
- Relocation of the 3684 (if required) to allow IBM service access.
- Using and following the problem determination procedures.
- Physical set up and connection of cables to TP lines/modems and loop.

**Maintenance:** 3684s located in the immediate sales area may preclude the acceptability of repair due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer should remove the unit to a repair facility located within the store for subsequent repair. At this location the CE will repair and test the unit.

### Storage Increments

1. Storage Increments -- 8K (#7710) and 24K (#7730) apply to the Point-of-Sale segment of the 3684 mdl 2 only. Storage Increment -- 16K (#7720) applies to the 3684 mdl 1 and 2 when Storage Expansion (#6990) is installed. If #6990 is not installed, then #7720 applies only to the Point-of-Sale segment of the 3684 mdl 2.
2. When storage is upgraded by field installation, the new Storage Increment feature displaces the old. Removed parts belong to the customer. Prior to using a removed module in another 3684, the compatibility of the part should be verified and an RPQ must be submitted to allow reinstallation on another machine.

### SPECIFY

- Voltage (AC, 1-Phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	120V #2800
200V #2806	
220V #2813	
230V #2821	
240V #2801	

**Note:** A 2.8m (9 ft) power cord and plug will be shipped with each machine from the plant of manufacture. The country code will be used to select a power cord and plug to the specifications most commonly used in that country.

Specify #2710 for power cord without a plug.

For Canada only, specify #9890 for locking plug, #9891 for nonlocking plug (both at 60 Hz, 120V, 1-phase). For Japan only, specify #9890 for locking plug, #9891 for nonlocking plug (for either 50 Hz or 60 Hz, 100V 1-phase)

**Note:** 120V AC, 60 Hz is compatible with existing 115V Systems.

- Store Loop Polarity Tester: Order Store Loop Polarity Tester, P/N 1859559 on MES (group 91) from Raleigh Order Department. One is furnished at no charge to each 3684 mdl 2 site for testing store loop wiring.

**Note:** The customer must provide (purchase, install and maintain) all necessary 3680 store loop communication lines within the store. Bulk loop cable is available from IBM.

- The loop polarity tester matches receptacle (female loop connector P/N 5162880) which can be ordered from IBM
- Machine Nomenclature:

Canadian English #2934	German #2929
Canadian French #2935	Italian #2932
English US #2950	Spanish #2931
French #2928	

- Controller Designation: Specify #9491 on the first 3684 to be used with a host system location and specify #9492 on each additional 3684 in the network. Specification of #9491 will result in 3684 controller and 3683 terminal code (DTR) being sent to specified host location.

When #9491 is specified, additional information must be specified as follows:

- Specify one of the following to indicate magnetic tape density (media) used at the host system location. This tape media is available under DOS/VS, OS/VS1 and OS/VS2 only.

#9412 -- 9 track, 800 bpi  
#9413 -- 9 track, 1600 bpi  
#9414 -- 9 track, 6250 bpi

The 3684 controller and 3683 terminal data will be sent via the specified media to the IBM Programming Systems Representative at the host system location for installation.

- Supplemental Specs (via Terminal Entry) are to be entered exactly as follows to indicate mailing address of host system location:

Line 1 -- IBM Programming Systems Representative  
Line 2 -- c/o (Name of Customer)  
Line 3 -- Street Address (or P.O. Box)  
Line 4 -- City,  
Country (Province), Postal Code

This is the address to which the first controller data tape will be automatically shipped for the first controller ordered (with specify code #9491). Whenever controller data is updated by an EC, the EC will be shipped to the most current microcode control (MC) address.

- Storage Expansion: If Storage Expansion-POS (#6991) is required specify #9444; if Storage Expansion-POS (#6991) is not required, specify #9445. See "Limitations" above.
- If #9491 is specified and there is a storage requirement that prevents 3683 operation with the current level of control code, specify #9490 with #9491. #9490 provides 3683 Control Code level EC 320503 which operates in the same control storage allocation as is required for 3683 Control Code level EC 320502. It is strongly recommended that new customers and 3687 customers do not take this specify option.

### SPECIAL FEATURES

#### Non-Communications Features

**Cash Drawer Integrated - 1st (#1572):** Provides a cash drawer with removable till that is contained within the 3684 base unit. The cash drawer has a media slot that will accommodate approximately a 25mm (1 inch) stack of documents. Opening the cash drawer is under program control. A cash drawer lock is provided. See note below for special ordering instructions for lock and till with adjustable dividers. Maximum: One. Limitations: Only one additional cash drawer may be ordered - either Cash Drawer Integrated-2nd (#1573), Cash Drawer-Distributed (#1575) or non-IBM Cash Drawer Attachment (#1577). Field Installation: Yes.

**Cash Drawer Integrated - 2nd (#1573):** Provides a second Integrated Cash Drawer with housing and removable till and is installed directly below Cash Drawer Integrated-1st (#1572). Functionally equivalent to Cash Drawer Integrated-1st (#1572). Maximum: One. Prerequisites: #1572. Field Installation: Yes.

**Cash Drawer-Distributed (#1575):** Provides a distributed cash drawer with housing and removable till that can be located up to 3.6ms (12 ft) from the 3684 base. Functionally equivalent to Cash Drawer Integrated-1st (#1572). Maximum: Two if no other cash drawer is ordered. One if Cash Drawer Integrated-1st (#1572) or

one non-IBM Cash Drawer Attachment (#1577) is ordered. Field Installation: Yes.

**Non-IBM Cash Drawer Attachment (#1577):** Provides an IBM-defined interface with cable and plug for attaching an non-IBM Cash Drawer. Maximum: Two if no other IBM Cash Drawer is installed. One if a Cash Drawer Integrated-1st (#1572) or Cash Drawer-Distributed (#1575) is ordered. Limitations: An attached non-IBM Cash Drawer must meet the IBM-defined interface as stated in the "IBM 3680 PSS Cash Drawer Attachment (#1577) Product Attachment Information" available from Industry Relations. Field Installation: Yes.

#### Notes

- For cash drawer tills and covers, see "Accessories" in the M3683 pages.

- Cash Drawer Lock: Each IBM Cash Drawer (#1572, #1573 or #1575) is equipped with a lock. A group of 25 unique lock numbers has been reserved to allow the customer to specify identical lock types on all terminals. This allows all cash drawers to be opened with the same key. If this is desired, specify one of the following features on the cash drawer order:

#9101	#9106	#9111	#9116	#9121
#9102	#9107	#9112	#9117	#9122
#9103	#9108	#9113	#9118	#9123
#9104	#9109	#9114	#9119	#9124
#9105	#9110	#9115	#9120	#9125

If none is specified, a lock will be selected at random from a larger group of lock types. Each cash drawer will be shipped with two cash drawer keys.

- Specify #9799 for each IBM Cash Drawer ordered (#1572, #1573 or #1575) if a till with movable bill dividers is desired.

**Distributed Keyboard Attachment (#3240):** Provides for locating the keyboard up to 3.6ms (12 ft) from the 3684 base. Prerequisites: #2712 or #2713. Maximum: One. Field Installation: Yes.

**Diskette Cover Lock (#3310):** Provides a lock for the diskette cover. (See Note below for special lock selection.) Maximum: One. Field Installation: Yes.

**Note:** Three groups of 10 unique specify numbers have been reserved to allow a customer to order a specific journal lock, manager keylock or diskette cover lock for each terminal. (The 3683 and 3684 uses the same journal lock and manager lock numbers, therefore all terminals within a store could have the same lock if desired.) If the same lock is desired on the journal, manager keylock and diskette cover, specify the respective locks with the same value in the last digit. That is, if #9203, #9303 and #9213 are specified, the same lock #9203 will be installed at all locations.

Journal Lock	Manager Keylock	Diskette Cover Lock
#9201	#9301	#9211
#9202	#9302	#9212
#9203	#9303	#9213
#9204	#9304	#9214
#9205	#9305	#9215
#9206	#9306	#9216
#9207	#9307	#9217
#9208	#9308	#9218
#9209	#9309	#9219
#9210	#9310	#9220

If none is specified, a lock will be selected at random from a larger group of lock types. Each lock feature will be shipped with two keys. For additional or replacement keys, see "Accessories".

**Display, 1-Sided (#3331):** An operator display and guidance unit consisting of an 8-digit numeric display and 32 indicators for operator guidance and machine status. The display is used to display numeric input or output data such as item number, credit number,

totals, amount due, etc. The 32 indicator lights point to labels that describe: (1) machine status such as: Ready, Wait, Offline, etc. (2) step-by-step guidance to lead the operator through a transaction or procedure. The unit will be shipped with the indicators labeled to correspond to the country language specified. However, the customer may re-label all but five indicators and, under customer program control, define their use. A legend sheet with a variety of legends will be shipped with each machine. Maximum: One. Limitations: Cannot be installed with Display, 2-Sided (#3332), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Display, 2-Sided (#3332):** An operator and customer display guidance unit which contains all the functions of Display, One-Sided (#3331) plus an 8-digit numeric display with six indicators on the back of the unit for customer viewing. Maximum: One. Limitations: Cannot be installed with Display, 1-Sided (#3331), Display-Customer Remote (#3333), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Display-Customer Remote (#3333):** A customer display and status indicator unit that is connected to the 3684 by a 3.6m (12 ft) cable. The unit consists of an 8-digit numeric display and 12 indicators (six are shipped with labels and six without). All are relegendable. The display and indicators are under customer program control. Maximum: One. Prerequisites: #3331. Limitations: Cannot be ordered with Display, 2-Sided (#3332), Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Distributed Display Attachment (#3335):** Provides for distributing Display, 1-Sided (#3331) or Display, 2-Sided (#3332) up to 3.6ms (12 ft) from the 3684 base. Maximum: One. Prerequisites: #3331 or #3332. Limitations: Cannot be installed with Alphameric Display (#3336), Remote 2nd Alphameric Display (#3337) or Distributed Alphameric Display Attachment (#3338). Field Installation: Yes.

**Alphameric Display (#3336) (NO LONGER AVAILABLE):** An operator/customer display consisting of two rows of eighteen characters each for a total of thirty-six characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3684. Maximum: One. Limitations: Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335). Field Installation: Yes.

**Remote 2nd Alphameric Display (#3337) (NO LONGER AVAILABLE):** A customer display that is connected to the 3684 by a 3.6m (12 ft) cable. The display consists of two rows of eighteen characters, each for a total of thirty-six characters and is used to display numeric as well as alphabetic data such as item number description, etc. Maximum: One. Prerequisites: #3336. Limitations: Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). Field Installation: Yes.

**Distributed Alphameric Display Attachment (#3338) (NO LONGER AVAILABLE):** Provides a cable for distributing the Alphameric Display (#3336) up to 3.6ms (12 ft) from the 3684 base. Maximum: One. Prerequisites: #3336. Limitations: Cannot be installed with numeric display (#3331, #3332, #3333 or #3335). Field Installation: Yes.

**Alphameric Display, Type II (#3346):** An operator/customer display consisting of two rows of 18 characters each for a total of 36 characters. The display is used to display numeric as well as alphabetic data such as item number, description, guidance information, etc. The display is connected locally to the 3684. Maximum: One. Limitations: Cannot be installed with a numeric display (#3331, #3332, #3333 or #3335) or with Alphameric Display (#3336 or #3337). Field Installation: Yes.

**Distributed Alphameric Display, Type II, Attachment (#3348):** Provides for distributing the Alphameric Display, Type II (#3346) up to 3.6m (12 ft) from the 3684 base. Maximum: One. Prerequisites: #3346. Limitations: Cannot be installed with a numeric display

(#3331, #3332, #3333 or #3335) or with Alphameric Display (#3336 or #3337). Field Installation: Yes.

**External Modem Interface (#3701):** Provides an EIA/CCITT interface for attachment of an IBM or other external modem. Limitations: Cannot be ordered with 1200 bps Integrated Modem (#5530). Maximum: One. Field Installation: Yes. Specify the following as applicable:

1. Specify #9695 if the 3684 is required to provide clocking (1200 bps maximum).
2. Specify #9126 if the 3863, 3864, 3872 Modem or #2838 if the 3976 Modem is to be attached.

**Expansion Feature (#3890):** Provides additional facilities on the 3684 mdl 1 to accommodate features that cannot be installed on the base unit. Maximum: One. Limitations: Applies to 3684 mdl 1 only. Prerequisites: This feature is a prerequisite to install #4945, #4946, #5422, #5431 or #5433. Field Installation: Yes. Note: No expansion feature is required on the 3684 mdl 2 to install its applicable features.

**External Storage Attachment (#4500):** Provides the ability to attach the External Disk Drive Feature (#4501). Maximum: One. Limitations: Mutually exclusive with IML-Write adapter (#4634). Applies to 3684 mdl 2 only. Field Installation: Yes.

**External Disk Drive (#4501):** Provides a 10MB file for attachment to the 3684 mdl 2 for storage of user data files. Cable attached to the 3684. Limitations: Applies to 3684 mdl 2 only. Prerequisites: #4500. Field Installation: Yes. When this feature is field installed the customer is responsible for performing the customer set up procedure.

**IML-Write Adapter (#4634):** Provides the 3684 mdl 2 with the ability to write an IML (Initial Machine Load) tape on a user-provided tape cassette recorder (refer to IBM 3680 Planning and Site Preparation Guide, GA27-3213, for Cassette Recorder interface requirement) which can be read by a 3683 Point-of-Sale terminal equipped with an IML-Read Adapter (#4633) feature. Maximum: One. Limitations: Applies to 3684 mdl 2 only. Mutually exclusive with 4800 bps Loop (#4710) and with External Storage Attachment (#4500). Field Installation: Yes.

**Journal Lock (#4690):** Provides a special lock and security cover over the printed journal. (See Note below for special lock selection.) Maximum: One. Prerequisites: #4695. Field Installation: Yes.

**Journal Printer (#4695):** Provides a journal print station with a journal roll take-up mechanism. Print line length is 38 characters at 15 characters per 25.4mm (inch) spacing. Vertical line spacing is 6.3 lines per 25.4mm (inch) at a line space rate of 20 lines per second. The all-points addressable characteristics of the printer permit the customer to highlight exceptions through special graphics designed and controlled by user programming. A 12.7mm (.5 inch) signature window is provided. Maximum: One. Field Installation: Yes. The journal station will accept 88.9mm (3.5 inch) diameter roll paper, 69.85mm (2.75 inch) wide.

**4800 bps Loop (#4710):** Provides a 3684 mdl 2 loop speed of 4800 bps in place of the standard loop speed of 2400 bps. Loop speed for 3683s to be attached must be specified as same speed. Maximum: One. Limitations: The sum of the communication speeds of all operational communications attachments to a 3684 mdl 2 must not exceed 7200 bps. These attachments include the store loop, host communications, and Serial I/O RPQ MN2257. Mutually exclusive with IML-Write adapter (#4634). Applies to 3684 mdl 2 only. Field Installation: Not recommended.

**Manager Keylock (#4905):** Provides a keylock mounted on the keyboard that allows customer programming to interrogate the position of the keylock when the key is operated. Possible uses include the enforcement of a manager override to a restricted security function. (See note below for special lock selection.) Maximum: One. Prerequisites: #2712 or #2713. Field Installation: Yes.

**Keyboards, General:** All keyboards have customer-legendable keybuttons except for the 11 keybuttons which have molded leg-

ends. All single- and double-function keys are under customer program control. Double keys may be moved, added or deleted by the user. Several colors and sizes of decal sheets with common legends by country language will be shipped with the 3684. See "Accessories" section for released keybuttons that may be ordered for any unique customer requirement. Maximum: One #2712 or #2713. Field Installation: Yes.

**35-Key Modifiable Keyboard (#2712):** A 35-key keyboard that includes:

- 5 Legended system function keys.
- 19 Unlegended function keys.
- 11 Keys with round, numeric legended keybuttons in the data entry arrangement.

**48-Key Modifiable Keyboard (#2713):** A 48-key keyboard that includes:

- 5 Legended system function keys.
- 32 Unlegended function keys.
- 11 keys with round, numeric legended keybuttons in the data entry arrangement.

**Note:** No Expansion Feature is required on the 3684 mdl 2 to install any applicable features.

**Magnetic Wand Reader (#4945):** A hand-operated wand used to read single track delta distance encoded magnetic merchandise tickets, credit cards, employee badges, etc. The small lightweight wand attached via a 1.2m (4 ft) long flexible cord allows encoded merchandise tickets to be read without removing them from the merchandise. See Note. Prerequisites: #3890 must be installed on 3684 mdl 1. Limitations: Cannot be installed with a non-IBM EAN/UPC Wand Attachment (#4946) or a non-IBM OCR Wand Adapter (#5422). Maximum: One. Field Installation: Yes. Note: The minimum encoding specifications that must be met by suppliers of credit cards, merchandise tickets and employee badges will be furnished upon request.

**Non-IBM EAN/UPC Wand Attachment (#4946):** Provides an adapter to support the attachment of a non-IBM EAN/UPC Bar Code hand-held wand reader. This feature provides an external connector to attach the non-IBM wand reader. The types of wand readers that can attach to this feature are either analog output wand readers (Intermac 1233R or equivalent) or digital output wand readers (Hewlett-Packard HEDS 3000 or equivalent) that meet the requirements stated in the "Non-IBM EAN/UPC Wand Reader Attachment Product Attachment Information for the 3680" document which is available from Industry Relations. Prerequisites: On the 3684 mdl 1, Expansion Feature #3890. The IBM Multiple Supplier Systems Bulletin (G120-6648) applies to the non-IBM wand reader. Limitations: When this attachment is used with an analog output wand reader, it is possible that this feature may experience failures if operated within five miles of a high power AM transmitter of the type used for television broadcasting. Cannot be installed with the Magnetic Wand Reader (#4945), non-IBM OCR Hand-Held Reader Adapter (#5422). Maximum: One. Field Installation: Yes. Specify: #9660 for analog wand interface or #9661 for digital wand interface.

**Non-IBM OCR Hand-Held Reader Adapter (#5422):** Provides an adapter to support the attachment of a non-IBM OCR hand-held wand reader that meets the requirements stated in the "IBM Retail System OCR A/B Wand Reader Product Attachment Information" document which is available from Industry Relations. This feature provides a 1.83m (6 ft) cable with an ITT - Cannon DBC-25S type connector to attach the non-IBM OCR Hand-Held Reader unit. Prerequisites: #3890 must be installed on 3684 mdl 1. Limitations: Cannot be installed with a non-IBM EAN/UPC Wand Attachment (#4946) or a Magnetic Wand Reader (#4945). Maximum: One. Field Installation: Yes.

**Non-IBM Coin Dispenser Adapter (#5431):** Provides an IBM-defined serial interface for attaching a non-IBM Manufactured Coin Dispenser that meets the requirements stated in the "3680 PSS System non-IBM Coin Dispenser Adapter Product Attachment Information" document which is available from IBM. For further information on the attachment, contact IBM. Prerequisites: #3890 for 3684 mdl 1 only. Maximum: One. Field Installation: Yes.

**Non-IBM Scale Adapter (#5433):** Provides an IBM-defined serial or parallel interface for attaching a non-IBM Manufactured Scale that meets requirements stated in the "IBM 3680 PSS non-IBM Scale Adapter Product Attachment Information" document which is available from Industry Relations. For further information on the attachment, contact IBM. Specify: #9385 if Serial Interface is to be installed; #9386 if Parallel Interface is to be installed. On Parallel Interface, specify #9387 if scale is a 10K metric scale. On Serial Interface, specify #9388 if scale is a 5-digit scale. Otherwise, scale is assumed to be a 4-digit scale. Prerequisites: #3890 for 3684 mdl 1 only. Maximum: One. Field Installation: Yes.

## COMMUNICATIONS FEATURES

A 3684 may be equipped with either the External Modem Interface (#3701) or the 1200 bps Integrated Modem (#5530) features.

**Note:** A 6.1m (20 ft) communication cable is provided for attachment to a standalone modem or to a communications facility when an integrated modem is used. If a standard 6.1m communication cable is not desired, specify #9061 for 3.0m (10 ft) cable, #9062 for 9.1m (30 ft) cable or #9063 for 12.2m (40 ft) cable.

**External Modem Interface (#3701):** Provides an EIA/CCITT interfaces for attachment of an IBM or other external modem. Limitations: Cannot be ordered with 1200 bps integrated Modem (#5530). Maximum: One. Field Installation: Yes. Specify the following as applicable:

1. Specify #9695 if the 3684 is required to provide clocking (1200 bps maximum).
2. Specify #9126 if the 3863, 3864, 3872 Modem or #2838 if the 3976 Modem is to be attached.

**1200 bps Integrated Modem (#5530):** Provides an integrated modem for operation over switched or nonswitched communication facilities at 1200 bps. Auto answer is provided when operating over switched network. No external modem is required. Limitations: Cannot be installed with External Modem Interface (#3701). Maximum: One. Field Installation: Yes. Specify the following when ordering this modem:

Specify one: #2830 for Switched Network, #2834 for Nonswitched Network.

(Canada only > If #2830 switched network is specified, also specify (one):

#9777 for 2025 Hz answer tone frequency required for operation at 1200 bps with non-IBM modems with Automatic Calling features.

#9778 for 2100 Hz answer tone frequency required for operation with host IBM 1200 bps integrated modems with Automatic Call Originate function. <)

If #2834 Nonswitched Network is ordered, also specify (one):

- #9651 for 4-wire facility
- #9652 for 2-wire facility

(Except Canada > Note: This feature includes the PSN line plate which is mandatory for attaching to the public switched telephone network. <)

**Storage Expansion (#6990):** Provides the capability of expanding the storage capacity of the 3684 mdl 1 and the control segment of the 3684 mdl 2 from a maximum of 56K to a maximum of 120K bytes. See configurator chart for maximum storage. Maximum: One. Field Installation: Yes. Limitations: Applies only to the 3684 mdl 1 and to the control segment of the 3684 mdl 2. Cannot be installed on a 3684-2 which had Storage Expansion-POS (#6991) installed prior to August 1981.

**Storage Expansion-POS (#6991):** (Mdl 2) Provides the capability of expanding the storage capacity of the point-of-sale segment of the 3684 mdl 2. The storage capacity of the point-of-sale segment is expanded from a maximum of 56K bytes to a maximum of 120K

bytes. This feature permits the installation of up to four Storage Increment-16K (#7720) per #6991. Maximum: One. Field Installation: Yes. Limitations: Storage Retention (#7785) cannot be installed on a 3684 mdl 2 that has Storage Expansion (#6990) and Storage Expansion-POS (#6991) installed at the same time. Note: This limitation is removed for machines shipped after August 1981. Prerequisites: #7730.

**Storage Increment -- 8K (#7710):** Provides an additional 8,192 bytes of storage. Maximum: One. Limitations: Cannot be installed with Storage Increments -- 16K (#7720) or Storage Increment -- 24K (#7730). Field Installation: Yes.

**Storage Increment--16K (#7720):** Provides an additional 16,384 bytes of storage. Maximum: One per 3684 mdl 2 point-of-sale segment; without Storage Expansion-POS (#6991) installed; four with Storage Expansion-POS (#6991) installed; four per 3684 mdl 1 or 2 control segment with Storage Expansion (#6990). Limitations: Cannot be installed with Storage Increment -- 8K (#7710) or Storage Increment -- 24K (#7730) in point-of-sale segment of 3684 mdl 2. Cannot be installed in the 3684 mdl 1 or the control segment of the 3684 mdl 2 without #6990. Specify: #9588 if increment is to be installed in point-of-sale segment of 3684 mdl 2; #9589 if increment is to be installed in control segment of 3684 mdl 2. Field Installation: Yes.

**Storage Increment--24K (#7730):** Provides an additional 24,576 bytes of storage. Maximum: One. Limitations: Cannot be installed with Storage Increment -- 8K (#7710) or Storage Increment -- 16K (#7720). Field Installation: Yes.

## 3684 Mdl 1 Storage Configurator

*-----*	
56K	Base Storage
	Storage Expansion #6990
72K	16K - #7720
88K	16K - #7720 (2)
104K	16K - #7720 (3)
120K	16K - #7720 (4)
*-----*	

## 3684 Mdl 2 Storage Configurator

*--Part 1 of 2--*					
Tot Stg Size	Storage Increment Feature	POS Segment			
		w/o #6990 or #6991		with #6990 Only	
		Stg Inc Only	Stg Incr and #9588	Stg Inc Only	Stg Incr and #9588
32K	-	Base	Base	Base	Base
40K	8K-#7710	x	-	x	-
48K	16K-#7720	-	x	-	x
56K	24K-#7730	x	-	x	-
72K	16K-#7720				
*-----*					

*--Part 2 of 2--*				
Tot Stg Size	Storage Increment Feature	POS Segmt	Control Segment	
		with #6991	w/o #6990	with #6990
		Stg Incr and #9588	Stg Inc	Stg Incr and #9589
32K	-	Base		
40K	8K-#7710	-		
48K	16K-#7720	-		
56K	24K-#7730	Req'd	Base	Base
72K	16K-#7720	x		x
88K	16K-#7720 (2)	x		x
104K	16K-#7720 (3)	x		x
120K	16K-#7720 (4)	x		x
*-----*				

**Note:** The number of #7720s must equal the sum of specify code #9588s and #9589s when #6990 and/or #6991 is ordered.

**Storage Retention (#7785):** Provides an internal battery and charger to power storage during a power interruption. All data and programs are protected so that a transaction in process when power was interrupted will continue when primary power is restored. The duration of storage retention depends on the charged state of the battery. When fully charged, storage will be retained for approximately 12 minutes for mdl 1 and approximately six minutes for mdl 2. If Storage Expansion (#6990) and Storage Expansion-POS (#6991) are installed on the same 3684 mdl 2, a fully charged battery will retain storage for approximately three minutes. The number of times the battery is discharged greatly affects battery life; therefore, facilities are provided to allow the customer through programming, to deactivate the battery for scheduled power off conditions such as store closing.

Replacement batteries are to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time and material basis. Replacement batteries may be ordered through IBM or through other sources that meet the battery specifications as defined by IBM. Maximum: One. Limitations: Cannot be installed on a 3684 mdl 2 that has Storage Expansion on both the point-of-sale segment and control segment. This limitation is removed for machines shipped after August 1981. If Storage Retention (#7785) is required on machines installed prior to August 1981, an RPQ will have to be submitted. Any parts removed due to this RPQ will be retained by IBM as property of IBM. Field Installation: Yes.

**Totals Retention (#8010):** Provides an additional 240 bytes of customer programmable storage that are powered by its own battery to protect loss of information such as totals, transaction number, terminal address, etc., when power is turned off or power interruptions occur. An early warning status condition will be given to the program when the battery needs replacing. Replacement batteries to be provided, installed, and removed by the customer. IBM will replace the battery if requested by the customer on a time-and-material basis. See "Accessories" for battery life characteristics and the types of batteries required for replacement. Maximum: One. Limitations: Applies to 3684 mdl 1 and to the Point-of-Sale segment of the 3684 mdl 2. Field Installation: Yes.

**Validation Printer (#8725):** Provides a flat-bed document validation station for printing on inserted forms. Prints 38 characters per line at 15 characters per 25.4mm (1 inch). Vertical line spacing is 6.3 lines per 25.4mm (1 inch) at a line space rate of 20 lines per second.

## MACHINES

The all-points addressable characteristics of the printer allow logos, special graphics including Kanji and highlighting to be designed and printed by user programming. Maximum: One. Limitations: Cannot be installed with Label Printer (#8726). Field Installation: Yes.

**Label Printer (#8726):** Provides a flat-bed station capable of printing on inserted forms or labels. Includes the capabilities of the Validation Printer Feature (#8725) and in addition includes the capability of printing labels. Prints 38 characters per line at 15 characters per 25.4mm (1-inch). Vertical line spacing is 6.3 lines per 25.4mm (1-inch) at the rate of 20 lines per second. The all points addressable characteristics of the printer allow logos, special graphics, and highlighting to be designed and printed by user programming. Label printing capabilities include "card stock" shelf labels and gummed labels on a carrier. Maximum: One. Limitations: Cannot be installed with Validation Printer feature (#8725). Field Installation: Yes. Note: If the Label Printer is to be field installed in place of the Validation Printer (#8725), removed parts belong to the customer.

## MODEL CONVERSIONS

Field installable. The parts removed for a model change become the property of IBM.

## ACCESSORIES

**Cables:** IBM shielded twisted pair cable (or equivalent) or bulk indoor loop cable is required for attachment of 3650 units. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for instal-

lation and maintenance of the cable and associated accessories. Twisted pair cable - For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and information, refer to the Systems Supplies operation within your country.

**Bulk Indoor Loop Cable (P/N 5165886):** See "Physical Planning Manual", GA27-3074, or "3680 Site Planning and Site Preparation Guide", GA27-3201, for bulk loop specifications.

**Cables (P/N 7838695):** Bulk Indoor Loop Cable is available for duct or plenum installation. The following information pertains to this cable only: Indoor Cable: UL approved for duct and plenum installation. (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 C to 105 C. This Bulk Indoor Loop Cable (P/N 7838695) should be ordered in multiple lengths of 304.8m (1,000 ft). Warranty: Loop Cable is warranted free from defects of workmanship and materials for 90 days.

For other available accessories, see "Accessories" in the M3683 pages.

## SUPPLIES

**Ribbons:** A black ribbon cartridge, P/N 7034640 or equivalent, is required.

**Diskette:** Diskette 2D, P/N 1766872, or equivalent, formatted with 256 byte blocks, is required for 3684 mdls 1 and 2.

**Paper:** Roll paper, 88.9mm (3.5 inch) diameter, 69.85mm (2.75 inch) wide, is required at the Cash Receipt and Journal print stations.

## 3687 CHECKOUT SCANNER

### PURPOSE

A fixed head optical reader which attaches to the 3683 (all models). It is particularly adaptable to all modes of checkout and it accommodates both standing and seated operators.

### MODELS

- Model 1 001 (NO LONGER AVAILABLE)
- Model 2 002

### HIGHLIGHTS

The 3687 Mdl 1 is 216.0mm (8.50 in.) high, not including the rails; 508.0mm (20.00 in.) wide; and 278.0mm (10.94 in.) deep, and reads the UPC regular (Version "A"), UPC zero suppression (Version "E"), EAN-13, and EAN-8 bar code symbols on supermarket items that are manually fed past the window of the 3687. Packaged as part of the total checkstand design, one 3687 can operate with one 3683 Supermarket Terminal mdl 1A, 2A or 3A.

The 3687 Mdl 1 is a Class 1 laser product which complies with the safety standards of the United States Department of Health, Education, and Welfare (Performance Standard for Laser Products, August 2, 1976 - Class 1, CFR Subchapter J).

The 3687 Mdl 2 is a flattop, rail-less, scanner with the same exterior dimensions as the 3687 Mdl 1. The 3687 Mdl 2 reads the UPC regular (Version "A"), UPC zero suppression (Version "E"), EAN-13, and EAN-8 bar code symbols on products that are manually fed past the window of the scanner.

(Except Canada, Japan > The 3687 Mdl 2 is equipped with a standard scratch resistant window.

(Canada, Japan only > The 3687 Mdl 2 is equipped with a standard replaceable window. Special Feature #3005 is available that provides a plant installed Scratch Resistant Window.

The 3687 Mdl 2 complies with the requirements for a (Canada, Japan only > Class IIa laser product as specified in the laser product performance standards of the United States Department of Health and Human Services regulation 21CFR1040.10 - Laser Products Performance Standards. In Accordance with U.S. Federal Regulations the 3687 Mdl 2 has the following "Warning Label" visible through the scanner window, "Class IIa Laser Product - Avoid Long-Term Viewing of Direct Laser Light". A similar bilingual label as approved for Canadian regulations will be installed on Canadian machines. (Except Canada, Japan > Class 1 laser product as specified in the IEC/TC-76 (CO)8 - Safety

of laser products, equipment classification, requirements and user's guide.

The product reads the Universal Product Code (UPC) which has been adopted in the United States as an industry specification for supermarket items identification. It also reads the European Article Numbering (EAN) symbol which has been adopted in World Trade countries as an industry specification for merchandise identification.

**Prerequisites:** The 3687 Mdl 1 requires a 3683 mdl 1A, 2A or 3A.

The 3687 Mdl 2 attaches to the 3683 Mdls 1, 2 and 3 via the Non-IBM OCR Hand-Held Reader Adapter (#5422) and to the 3683 Mdls 1A, 2A and 3A via the scanner adapter which is standard on these models. These adapters operate only under the 3650 Programmable Store Systems.

**Customer Responsibilities:** 3687 window replacement is a customer responsibility. See S3650 pages for general description of customer responsibilities.

Copies of the UPC Symbol Specifications and the UPC Guidelines are available at a charge from the UPC Council. Write to:

Uniform Product Code Council, Inc.  
 7061 Corporate Way, Suite 106  
 Dayton, Ohio 45459  
 513-435-3870

For copies of the General Specifications for the Article Symbol Marking (EAN), write to:

Secrétaire General, E.A.N.  
 Rue Des Colonies 54, BTE 8  
 1000 Bruxelles, Belgique

For each 3687, the customer must provide a switchable on and off power outlet for a locking plug. A 1.8m (6 ft) power cord and locking plug will be shipped with each machine.

(Except Canada > For each 3687, the customer must provide a switchable on and off power outlet.

Refer to IBM 3650 PSS Installation Manual - Physical Planning, GA27-3167, or IBM 3680 Programmable Store System - Planning and Site Preparation Guide, GA27-3167, for requirements for mounting the 3687, both models, in a checkstand.

### SPECIFY

- Voltage (AC, 1-phase):

50 Hz		60 Hz
100V	#2804	100V #2730
110V	#2805	120V #2800*
200V	#2806	

**MACHINES**

220V #2813  
230V #2821  
240V #2801

\*For Canada only, note that 120V AC 60 Hz is compatible with existing 115V systems.

**Note:** A 2.8m (9 ft) power cord and plug will be shipped with each machine from the plant of manufacture. The country code will be used to select a power cord and plug to the specifications most commonly used in that country. (Japan only > Specify #9890 for locking plug or #9891 for nonlocking plug (for either 50 Hz or 60 Hz, 100 Volts 1-phase).

- Machine Nomenclature:

Australian #2918	English US #2924
Canadian English #2934	Japanese #2930
Canadian French #2935	Spanish #2931

**Note:** #2918 must be specified in Australia in order to have a legally required laser warning sign attached to the scanner.

- Alternate Mounting System: Specify #9555. Refer to IBM 3650 PSS Installation Manual - Physical Planning, GA27-3167 for details.

**SPECIAL FEATURES**

(Canada, Japan only > Scratch-Resistant Window (FC #3005): (Mdl 2) Provides a scratch-resistant window

installed at time of original order. This window is intended to be permanently installed. Field Installation: No. Maximum: One. (Accessory (PN 7032261) Scratch - Resistant Window kit can be used for field installation on the 3687 Mdl 2 installed without Feature Code #3005.)

**MODEL CONVERSIONS (None)****ACCESSORIES**

**Scratch Resistant Window Kit (P/N 7032261):** A scratch resistant window in an installation kit. Intended to be permanently installed by the user. User installable only. Replaces the expendable window with which the 3687 is equipped.

**Window (P/N 1749143):** The 3687 Mdl 1 (Canada, Japan only > Mdl 2 Checkout Scanner (Canada Japan only > , Mdl 2 without Scratch - Resistant Window (#3005), is equipped with a replaceable window. With use, it will get scratched and need to be replaced. Window replacement is a customer responsibility.

**SUPPLIES**

Contact your Country DP Supplies Coordinator. <SS Contact IBM.

## 3689 STORE COMMUNICATIONS UNIT

### PURPOSE

To provide communications for the 3650 Programmable Store System over (Canada only > PTT <)-supplied communications network facilities.

### MODELS

#### Model 1 001

**Prerequisites:** A 3650 Programmable Store System with (minimum requirements):

- A 3651 Store Controller mdl A75, B75, C75, or D75 with the 4800 bps Loop Adapter (#4895) and the 3669/3689 Attachment (#8069).
- Access to an appropriate switched network communications facility.
- A store loop equipped with at least one 3683 Point of Sale terminal with 4800 bps specify feature #9430.
- Communications with any virtual storage S/370 or 4331 or 4341 processor via a properly equipped 3704 or 3705 or a Communications Adapter on a 4331.
- Communications with any virtual storage 4341, 4361, 4381, 303X, 308X or 3090 processor via a 3720 Communication Controller.

**Customer Setup:** The 3689 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. (Canada only > Switched Network transmit level switches must be set by the customer at setup time. <)

### HIGHLIGHTS

The 3689 mdl 1 provides communications between a 3651 Store Controller mdl A75, B75, C75, or D75 and:

- The host S/370 or 4331 or 4341 processor via a 3864 Modem mdl 2 attached to a 3704, 3705 or 3725 Communications Controller with switched line features or a Communications Adapter feature on a 4331.
- The store loops at another predesignated store location via another 3689 mdl 1 at that location, to provide backup operation for the store in case its 3651 Store Controller mdl A75, B75, C75, or D75 is inoperative.
- The 3651 Store Controller mdl A75, B75, C75, or D75 via another 3689 mdl 1 in another predesignated store in a controller-to-controller operation via Auxiliary Communications Adapters (#6185) for the purpose of data transfer or data reconciliation when the backup operation is terminated.
- The host 4341, 4361, 4381, 303X, 308X or 3090 processor via a 3864 Modem model 1 attached to a 3720 Communication Controller and operating over switched lines.

Additional characteristics of the 3689 mdl 1 are:

- Operates in half-duplex mode over 2-wire switched telecommunication networks. Operating mode is point-to-point.
- A microprocessor for signal processing.
- Auto Answer: Automatic Answering of Switched Network calls.
- Automatic Speed Selection: The transmission speed of the 3689 mdl 1 follows the transmission speed (4800/2400 bps) of

the Host 3684 mdl. Note: There is no Automatic Speed Selection when loop communication is involved.

- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- When operating with a Host S/370 or 4331 or 4341 processor via a 3864 mdl 2, the modem diagnostic functions, referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Release 1 or 2 (5735-XX6)
  2. Network Problem Determination Application (NPDA) Release 2 (5735-XX8)
  3. ACF/NCP Release 2.1 (5735-XX1)

**Diagnostics:** Built-in diagnostics - The 3689 mdl 1 will respond to diagnostic commands from the Host system and provide its status and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 for data transmission. This diagnostic status/test requests can be interspersed with data requests without interrupting 3651 sessions.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem or modem interface.

NPDA will utilize the modem facilities to provide alert messages on error threshold and display formatted modem test results.

In addition, tests can also be executed from the 3689 operator panel. These manual tests include:

- Self-test -- this includes an extensive test of modem micro-code, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Lamp test -- tests all indicator lights on the operator panel.

### Communication Facilities

**Public Switched Networks:** The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to M2700 pages for further details.

**Privately-owned Communication Facilities:** Equivalent to above.

**International Facilities:** Transmission of data between the United States and Canada on switched facilities is supported.

**Attachment to Facilities:** (Canada only > The cables supplied to attach the 3689 mdl 1 to the public switched network are terminated with spade lugs for attachment to a CBS type data coupler (WE1001A, series 5 or later, or WE1001F or equivalent). <)

**Note:** Telephone sets (handsets) are required with switched facilities at all 3689 mdl 1 locations.

**Customer Responsibilities:** The customer must be informed of his responsibilities as detailed in the M2700 pages, and in the site preparation section of the "3650 Programmable Store System Installation Manual - Physical Planning" (GA27-3167).

The customer is also responsible for:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Switched Telecommunication Network -- arranging for the telecommunication service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device. The customer must also inform the telecommunication service supplier that the rate of data transmission will be faster than 1200 bps.
3. If the 3689 is to be attached to a non-IBM product, the interconnecting cable between the business machine and the modem must be supplied by the business machine.
4. Unpacking and placing of the 3689, physical setup, and connection of cables at setup time.
5. Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
6. Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
7. All three of the following program products at the current release must be installed for LPDA to function between the Host and the 3689 mdl 1 if the customer requires the LPDA function.

NCCF (5735-XX6)  
NPDA (5735-XX8)  
ACF/NCP (5735-XX1)

8. Obtaining, installing and testing the store loops.

#### **SPECIFY**

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): #9890 for locking plug, #9891 for nonlocking plug. If standard 3.0m (10 ft) power cable is not required, specify #9986 for 1.8m (6 ft) cable.
- (Canada only > Language Groups: #2935 for Canadian French. If Canadian French (#2935) is not specified, English (#2924) will be provided. <)
- Telecommunication Cable (modem to telecommunication line): Specify #9710 for 3m (10 ft) (Canada only > cable, includes the interface to the external line coupler. The External Line Coupler is installed by the PTT. <)

#### **SPECIAL FEATURES (NONE)**

#### **MODEL CONVERSIONS (NONE)**

#### **ACCESSORIES (NONE)**

#### **SUPPLIES (NONE)**

**3694 DOCUMENT PROCESSOR****PURPOSE**

A programmable MICR Reader-Inscriber-Sorter for remote processing of documents used primarily in the Finance Industry. As a member of the 3600 Finance Communication System, the 3694 combines the programming and host communication facilities of the 3601 Finance Communication Controller with MICR document handling capabilities.

Can attach to S/370, 30XX, or 4300 processors via a 3705 or 3725 Communications Controller (to 4331 also via the Communications Adapter) using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities.

Can attach to S/34, S/36 or S/38 Processors via communications adapter using Synchronous Data Link Control (SDLC) transmission over various common carrier or user-owned transmission facilities. Application support for S/34 is provided by the following Check Processing Executive/General Support FDPs, or user supplied programming. Document Control Section Edit (5798-RFL), Table Preparation Facility (5798-RFK), File Translation Facility (5798-RFJ), Communication Support Facility (5798-RKH) and Sort Preparation Facility (5798-RKG).

Can attach to 4341, 4361, 4381, 303X, 308X or 3090 processors via a 3720 Communication Controller using SDLC transmission over various common carrier or user-owned transmission facilities.

Application support for S/36 is provided by the following Check Processing Executive/General Support FDPs, or user supplied programming. Document Control Section Edit (5798-RFL), Table Preparation Facility (5798-RQX), File Translation Facility (5798-RQW), Communication Support Facility (5798-RQY) and Sort Preparation Facility (5798-RQZ).

**Note:** See "Programming" and "SCP" pages for attachment capability.

The 3262 models 3 and 13 or the 4234 model 1 line printers may be attached to a 3694 for high-speed report printing. The 3287 models 1 and 2, 3268 model 2 and 4224 model 2XX printers may also be attached for lower volume printing.

The 3694 is available in eight models: Models 1A, 1B, 1C and 1D and models 2A, 2B, 2C and 2D. They perform identical functions except that the model 2s have an automatic document feed and high-speed sorter path for program controlled sorting and/or data capture at up to 400 6-inch documents per minute.

Multiple 3694s can be attached to a given 3694 or to a 3602 Finance Communication Controller for data concentration and control.

**MODELS**

**Model 1A A01 (NO LONGER AVAILABLE AFTER JANUARY 14, 1986):** One Distribution Stacker Module - 6 pockets

**Model 1B B01 (NO LONGER AVAILABLE AFTER JANUARY 14, 1986):** Two Distribution Stacker Modules - 12 pockets

**Model 1C C01 (NO LONGER AVAILABLE AFTER JANUARY 14, 1986):** Three Distribution Stacker Modules - 18 pockets

**Model 1D D01 (NO LONGER AVAILABLE AFTER JANUARY 14, 1986):** Four Distribution Stacker Modules - 24 pockets

**Note:** Pockets are also known as Stackers.

All models include a compact diskette drive supporting Diskette 1 or Diskette 2, an operator console, a master list printer, a keyboard, MICR read and inscribe capability, a document correction station, item identification and numbering capability, an endorser, and approximately 81,000 bytes of user-programmable storage. User storage can be expanded, optionally, up to a maximum of approxi-

mately 113,000 bytes. A second compact diskette drive can also be added, optionally, providing an additional 270,000 or 568,000 bytes of storage, depending upon whether Diskette 1 or Diskette 2 is used.

**Model 2A A02:** One Distribution Stacker Module - 6 pockets

**Model 2B B02:** Two Distribution Stacker Modules - 12 pockets

**Model 2C C02:** Three Distribution Stacker Modules - 18 pockets

**Model 2D D02:** Four Distribution Stacker Modules - 24 pockets

All models also have a compact diskette drive supporting Diskette 1 or Diskette 2, an operator console, a master list printer, a keyboard, MICR read and inscribe capability, a document correction station, item identification and numbering capability, an endorser, approximately 81,000 bytes of user-programmable storage, plus an automatic feeding device and high-speed document path for operations at rates up to 400 documents per minute for 6-inch documents. User storage can be expanded, optionally, up to a total of approximately 113,000 bytes. A second compact diskette drive can also be added, optionally, providing an additional 270,000 or 568,000 bytes of storage, depending upon whether Diskette 1 or Diskette 2 is used.

**HIGHLIGHTS**

Combines document inscribing (E13B), reading, sorting, identifying and endorsing functions with data capture and storage accumulation, and communication capabilities under program control. Can communicate with a host system using any one of two SDLC communication features and an EIA Interface feature with an external modem, or by direct attachment to a 3705, 3720 or 3725 or 4331 or S/34 Communications Adapter or Communication Attachment on the S/38.

Houses a diskette drive which can accommodate 2-sided diskettes offering storage of user data and programs, i.e., sort table, all items file and cluster summary data.

Accommodates up to four Distribution Stacker Modules with each containing six distribution pockets. Each distribution pocket has a capacity of approximately 400 documents. Depending upon the mdl, a 3694 can have one, two, three or four such modules. Optional distribution list printers may be dynamically assigned under program control to individual pockets to list the contents of each pocket as the document enters, or on a deferred basis.

An optional microfilm feature is available to record images of documents processed on the full function path (mdls 1 and mdls 2) and documents processed on the sorter path (mdls 2). Film image format is duplex mode (front and rear of documents recorded adjacent to each other). Film record includes header data, item sequence numbers and frame marks (blips). An optional PAID stamp feature is available on 3694 mdls 2 for face cancelling items as PAID for items processed on the sorter path.

A 3694 mdl 2A, 2B, 2C or 2D is equipped with an automatic feed/high-speed path. It can capture data and fine-sort documents at a rate of up to 400 documents per minute (for 6-inch documents).

The 3262 (mdls 3 and 13), 3287 (mdls 1 and 2), 4224 (mdl 2XX), and 4234 (mdl 1) printers 3268 (mdl 2) may be attached to offer, with appropriate programming support, an ability to print host, diskette or program-supplied print line images.

Clusters of up to four 3694s may be attached to another 3694 for communications concentration and control. Depending upon the applications and operational considerations, up to 18 3694s may be attached to a 3602 Finance Communication Controller for large cluster concentration and control. (For attachment of more than eight 3694s to a controlling 3602, Systems Assurance approval is required.)

**Transmission:** The 3694 can operate over common carrier-provided or equivalent customer-owned facilities. For information concerning these facilities, see the M2700 pages.

**Modems:** External modems operating at up to 9600 bps may be attached when used with SDLC feature #4502. For information concerning modem attachment support, see the M2700 pages.

**Prerequisites:** If Host connected - a communications controller with appropriate features -- see M3705, 3720, 3725 or 4331 (for Communications Adapter #1601 on the 4331), 5340, 5360, 5362 or 5381 pages.

**Bibliography:** GC20-0370, IBM S/370 Bibliography, and GC27-0001, "IBM 3600 Finance Communication System, System Summary".

## SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage (1-phase, 60 Hz): All machines will be shipped for 208V service. If necessary the IBM customer service representative can convert machines to 240V service at customer location.
- Machine Nomenclature (Canada and Japan only): Canadian French #2935, Japanese #2930.
- Power Cord: Select appropriate length power cord, and specific type of cord.
  - 1.83m (6 ft) cord, specify #9986 with  
#2742, locking plug (L6-20P), for Canadian machines (all other countries shipped without plugs).
  - 4.27m (14 ft) cord, specify #9987 with  
#2742, locking plug (L6-20P), for Canadian machines (all other countries shipped without plugs).
- Controller Designation: Media distribution of controller data. Specify #9491 to identify the initial controller (3601, 3602 or 3694) ordered for use with a host system location, or specify #9492 to identify additional controllers (3601, 3602 or 3694s) per host system. #9491 should only be ordered when host media DTR tape containing microcode is required. If a pre-configured diskette is specified when ordering the CHX/3694 Application Program Product (PP 5748-F53), then specify #9492 for the controller designation.

When the initial controller is a 3694, at least one of the following specify codes (#9493, #9494 or #9495) is required:

If the initial controller (with specify #9491) is a 3694, and if there is a 3614 with a first position designator and a specify #9002 attached to any 3601 or 3602 on the same host system, then specify #9493 is required.

If the initial controller (with specify #9491) is a 3694, and if there is no 3614 or 3624 with a first position designator attached to any 3601 or 3602 on the same host system, then specify #9494 is required.

If the initial controller (with specify #9491) is a 3694, and if there is a 3614 with a first position designator and a specify #9001, or a 3624 with a first position designator attached to any 3601/3602 on the same host system, or if encryption capability via the data encryption standard (DES) is desired on a 3601 or 3602 on the same host system, then specify #9495 is required.

If #9491 is specified, select the specify number of the desired media:

- #9412 9/800 Magnetic Tape
- #9413 9/1600 Magnetic Tape
- #9414 9/6250 Magnetic Tape

If magnetic tape is not available on designated CPU, then select one of the following media (DOS/VS or VSE users only):

- #9431 80-column cards
- #9432 96-column cards

If card or tape inputs are not available at the host location, contact Finance Industry Marketing for guidance.

When feature #9491 is specified, additional shipping information is required.

Supplement Spec (via DPMO entry) is to be entered exactly as follows to indicate shipping address of the Host System location:

- Line 1 -- IBM Programming Support Representative (PSR)
- Line 2 -- c/o (Name of customer)
- Line 3 -- Street address (or P.O. Box)
- Line 4 -- (etc.) -- City, Province, Postal Code

This is the address to which the first controller (3601, 3602 or 3694) data tape will be automatically shipped for the first controller ordered (with specify #9491). Whenever controller data is updated by an EC, it will be shipped to the most current MC address.

- Typical Configuration Guideline: As a reference, the most typical 3694 featured machine configuration is as follows:

- 3694 mdl 2B - Base machine with 12 pockets and Autofeed/Sorter path
- #1015 - Additional diskette storage
- 2X #3201 - Two distribution list printers
- #3701 - EIA Interface
- #4502 - SDLC communication without clocking

Other features commonly ordered are:

- #5121 - Microfilm
- #5450 - PAID Stamp

Required Specifies must also be ordered.

The following is a more detailed guide to configuring specific 3694 machines. It is based upon the operational diskette levels provided by the IBM 3694 application program product, CHX/3694 (PP 5748-F53):

**Basic 3694 Configuration:** Basic 3694, when ordered with specify software feature code #9145. This configuration is for 3694s which communicate directly with S/370, S/34, S/36, S/38 or 4300 processors. This configuration also applies to a 3694 which is attached to another controlling 3694 or 3602 controller (clustered configurations).

**Basic with Concurrent Remote Print Configuration:** Basic with Concurrent Remote Print, when ordered with specify software code #5245. This configuration is for 3694s that communicate directly with S/370 or 4300 processors. Concurrent check processing and report printing can also be accomplished with this configuration.

**Cluster Controller 3694 Configuration:** Cluster Controller 3694, when ordered with specify feature code #9245. This configuration is for 3694s which communicate directly with S/370 or 4300 processors, and have other 3694s attached for concentration and control.

**Stand-Alone 3694 Configuration:** Stand-Alone 3694, when ordered with specify software feature code #9445. Data is exchanged with the host by exchanging diskettes. The pre-configured diskette (CHX/3694) will have no communications application code but will provide the logic necessary to support diskette interchange.

Required Features/Models

Application/Use	Stand-Alone 3694	Basic 3694	Basic 3694 with Concurrent Print	Cluster Controller 3694
Software Feat. Code	#9445	#9145	#5245	#9245
Communication to host through modem which does not have internal clocking, or for direct attachment to 3705 or 3725 at speeds of 1200 or 2400 bps.	--	#3701 and #4501	#3701 and #4501	#3701 and #4501
Communication to host through modem which has internal clocking speeds up to 9600 bps. to 4331 Communication Adapter without modems. S/34 Communication Adapter or to controlling 3694 or 3602 without modems.	--	#3701 and #4502	#3701 and #4502	#3701 and #4502
Additional storage requirements	--	--	#1007, #9602	#1007, #9601 and #1007, #9602
Cluster control	--	--	--	#1015, #4401
Attachment of printers (See note below)	#3101	#3101	#3101	#3101
Additional disk storage for increased MICR item data storage.	#1015	#1015	#1015	--
In-line Microfilming.	#5121	#5121	#5121	#5121
Paid Stamping (mdl 2 only)	#5450	#5450	#5450	#5450
Printing of pocket distribution list:				
- Typical application uses one printer per six stacker/pockets.	#3201 (mult)	#3201 (mult)	#3201 (mult)	#3201 (mult)
High-speed sorter path:				
- Typical application uses twelve or more pockets (mdls 2B, 2C or 2D).	Mdl2s	Mdl2s	Mdl2s	Mdl2s
Pocket-full lights:				
- Typical application uses one such feature per six stacker/pockets.	#5540 (mult)	#5540 (mult)	#5540 (mult)	#5540 (mult)

**Note:** Printer mdl description (Not for use with S/34, S/36 and S/38 host systems):

3262-13 325 lpm  
 3262-3 650 lpm  
 3287-1 80 cps  
 3287-2 120 cps  
 3268-2 340 cps  
 4224-2XX 200/400 cps (Non-IPDS Mode)  
 4234-1 300 lpm

- Cables: See "Accessories" for ordering instructions for 3262 or 3237 printer cables. Communication cables for the 3694 are provided without charge when feature #3701 (EIA Interface) is ordered through the normal WTAAS procedure. Also see Installation Manual - Physical Planning, GC31-2010.

- Frames: The number of frames for shipping purposes will be determined by the manufacturing plant based on the specific mdl and configuration ordered. See the "3694 Document

Processor Installation Manual - Physical Planning", GC31-2010, for details.

- #9580 to request shipping by air (required for areas outside Canada and the Continental U.S.). All air shipments are in three frames (four, if a 3- or 4-stacker module configuration is ordered, mdls C and D).

If air shipment is required within the Continental U.S. or Canada, the branch office must send a request for premium transportation to the IBM Charlotte plant of manufacture (form #625-3433-01).

- #9481 for system operation without host CPU, host 3694, or host 3602 attachment.

**Note:** MANDATORY for all orders without hosts.

- Tool Kits: Required for CE Maintenance. For Rental Customer -- specify on first 3694 order for each customer site. If required for multiple machine sites, an additional Tool Kit(s) is available on a no-charge MES. For Purchase Customers -- specify on each 3694 order. When installed rental 3694s are purchased, a Tool Kit is to be ordered on a no-charge MES for each machine. Specify #9766 for Base Machine Service tools.

Specify #9441 for microfilm feature service tools. The microfilm tool kit consists of a 3694 microfilm cassette, a set of test documents, and a roll of film. Individual microfilm tool kit parts are available from Mechanicsburg.

### SPECIAL FEATURES

#### Non-Communication Features

**Add'l Storage (#1007):** Provides an additional 32,768 bytes of control storage or additional 32,768 bytes of user-programmable storage. Specify #9601 for control storage; it is required to run software feature code #9245. Specify #9602 for user storage; it is required to run software feature code #5245 or software feature code #9245. A maximum of one additional storage feature for control storage (#9601), and a maximum of one additional storage feature for user programming (#9602) may be ordered for a 3694 mdl 1 or 2.

**Auxiliary Compact Diskette Drive (#1015):** The Auxiliary Compact Diskette Drive supporting Diskette 1 and Diskette 2 provides an additional storage capacity of approximately 270,000 or 568,000 bytes. No area on the auxiliary (or secondary) drive will be reserved for the control program. Maximum: One. Field Installation: Yes.

**Note:** Support for feature #1015 is provided by Extended Diskette Access Method (EDAM) Base, EDAM Allocate/Deallocate (LDKT instruction), and EDAM Temporary File Support. Refer to "Device Attachment Factors Table" and "Attachment Factor Functions" section.

**Device Cluster Adapter (DCA) (#3101):** Permits attachment of any combination of one or two 3262 (mdls 3, 13), 4224 (mdl 2XX), 4234 (mdl 1), 3268 (mdl 2) or 3287 (mdls 1, 2) printers to a 3694. Limitations: Maximum distance from 3694 to terminal is 1,500m (4,920 ft). Not for use with S/34, S/36 and S/38 host systems. Note: Attachment of two printers requires Systems Assurance Review. Maximum: One. Field Installation: Yes.

**Distribution List Printer Module (#3201):** The Distribution List Printer (DLP) prints two distribution lists, each containing up to 18 characters per line. Independent paper movement allows either list, or both, to be printed at up to 180 lines per minute. Each list is dynamically assignable to distribution pockets to print, under program control, data from, or relative to, documents selected to corresponding distribution pockets. Maximum: Six distribution list printers (for up to 12 distribution lists) may be ordered per 3694. The maximum is dependent upon the number of Stacker Modules. Field Installation: Yes. One "Drawer Position" is available in the base of each of the first three stacker modules for installation of distribution list printer drawers. Drawers can contain one or two distribution list printers (providing 2 or 4 distribution lists).

The positioning options of the distribution list printers modules is as follows, and is predetermined by the quantity ordered:

	Stacker Module						
	1	2	3	4			
Position	1A	1B	2A	2B	3A	3B	N/A
	N/A = Not available						

Quantity of Printers Installed	Required Positioning of Installed Printers
1	1A
2	1A, 1B
3	1A, 1B, 2A
4	1A, 1B, 2A, 2B
5	1A, 1B, 2A, 2B, 3A
6	1A, 1B, 2A, 2B, 3A, 3B

When ordering additional distribution list printer modules for field installation, the next sequential position must be ordered in accordance with the chart above. The position(s) must be indicated by the following specify code(s):

Position	Specify
1A	#9101
1B	#9102
2A	#9105
2B	#9106
3A	#9109
3B	#9110

**Controller Attachment (#4401):** Required to attach up to four 3694s to a controlling 3694 at a link speed of 9600 bps. This feature is required in the controlling 3694 only. Limitations: Attached 3694s must each be placed within 100 cable-feet of the controlling 3694.

**Note:** Support for feature #4401 is provided by Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1, and SDLC/SNA Attachment Part 2. Refer to "Device Attachment Factors Table" for the 3694. Maximum: One. Field Installation: Yes.

**Microfilm (#5121):** Provides for filming front and rear of documents processed on 3694 mdls 1 and mdls 2 in duplex format (front and rear of item recorded adjacent to each other on film). Item sequence number is recorded (exposed) on film for every other item filmed. Frame marks (blips) are recorded on film for each item filmed. Indicative data can be recorded on film as header film records. Minimum image resolution is 110 lines per millimeter. Camera reduction is 50:1. Users specify that microfilming is active on a 'per-run' basis. Rated filming speed is the same as processing speed for the mdl 2 sorter path (400 documents per minute for 6-inch documents). A film cassette to house the film supply and film take-up reel is provided with the feature. Additional film cassettes can be ordered from "Accessories" below. The microfilm feature uses 16mm, medium- to high-speed, unperforated film, and can accept either 100-ft (thick-base) or 215-ft (thin-base) film supply reels. Capacity of film is approximately 13,300 items (front and rear) per 100 feet of film. Maximum: One. Field Installation: Yes.

**Note:** A CE microfilm tool kit is required to install this feature. Refer to "Tool Kit" description under "Specify" for ordering information.

**Paid Stamp (#5450):** Provides for face cancelling items as PAID on 3694 mdl 2 only. Stamping mechanism is located on sorter path of mdl 2s and is activated on a user-specified 'per-run' basis. At least one full stamping of the word PAID will appear on each document, and additional partials may also appear. Limitations: 3694 mdl 2s only. Maximum: One #5450 per 3694 mdl 2s. Field Installation: Yes. Prerequisites: #5121.

**Stacker Lights (#5540):** This feature provides six individual pocket lights per Stacker Module which may be installed on any Module as required. An individual light on a pocket illuminates when a pocket

is approximately three quarters full. The light is switched off when the pocket is cleared. If the transport has stopped due to a full pocket, the operator must restart via the green start button. Limitations: Can only be installed on machine serial number 10023 and above. Maximum: One per system. Field Installation: Yes. Prerequisites: Specify #9501 on Stacker Module 1; #9502 on Stacker Module 2; #9503 on Stacker Module 3; #9504 on Stacker Module 4.

**Control Storage (#9601):** This feature is required to run software code #9245. Used for attachment of certain device types, functions, and features which have associated attachment factors. See "Device Attachment Table" below. Some combinations of device types, functions, and features can be accommodated with no additional control storage. Other combinations require additional control storage as provided by the Add'l Storage feature #1007 with the Control Storage specify #9601. Refer to Attachment Factor Functions and Device Attachment Table sections for a further explanation of attachment factors and required control storage. Maximum: One. Field Installation: Yes.

**User-Programmable Storage (#9602):** This feature is required to run software feature code #9245 or #5245. Used for the instruction sections of application programs and a limited amount of configuration data and application program constants. Most configuration data and application program constants cannot reside in this additional user-programmable storage. Maximum: One. Field Installation: Yes.

## Communications Features

For operation without attachment to either a host processor or a controlling 3602 or 3694, specify #9481 must be used.

For communications with a controlling 3602 or 3694, each attached 3694 must be equipped with the EIA Interface (#3701) and the SDLC Communications Feature without Business Machine Clocking (#4502).

For communications with a S/370, S/34, S/36, S/38 or 4300 series host processor, each 3694 must be equipped with one of the following SDLC features and the EIA Interface (#3701).

**EIA Interface (#3701):** Provides the appropriate cables and interface logic necessary to attach an external IBM modem for communications to the host processor through the 3704, 3705 or 3725 the Communications Adapter (#1601) feature on the 4331 Processor; or the Communication Adapter on the S/34, S/36 or the appropriate system communication features on the S/38; or for direct local attachment to the 3705, 3725 4331 Communications Adapter or a controlling 3602 or 3694 without requiring modems; see M3602, 3705, 3725 (#4716), 4331, 5340, 5360 or 5381 pages. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. Maximum: One. Field Installation: Yes. Cable length from this feature to the controlling 3602/3694 cannot exceed 30.4m (100 feet). Cable length for attachment to an external modem cannot exceed 8.1m (20 feet). See the "3694 Installation Manual - Physical Planning", GC31-2010, for details. Prerequisites: #4501 or #4502.

**SDLC Communications With Business Machine Clocking (#4501):** Required for attachment to communication lines through the EIA Interface (#3701) at 1200 bps or 2400 bps with any external modem which does not have internal clocking, or for local attachment to a 3705 or 3725 Communications Controller at 1200 or 2400 bps (feature #4716). Limitations: Cannot be installed with #4502. Maximum: One. Field Installation: Yes.

**SDLC Communications Without Business Machine Clocking (#4502):** Required for attachment to communication lines through an external modem which does have internal clocking at speeds up to 9600 bps or for local attachment to a 4331, S/34 or S/38 Communications Adapter without Modems. It is also required in 3694s which attach to a controlling 3694 or 3602. Limitations: Cannot be installed with #4501. Maximum: One. Field Installation: Yes. Prerequisites: #3701.

**Note:** SDLC as used in the 3694 Document Processing system conforms to a subset of both the ISO HDLC and NASI ADCCP Standards. For details of the conformance, see IBM Synchronous Data Link Control General Information Manual, GA27-3093-2.

## DEVICE ATTACHMENT FACTORS

### Attachment Factor Information

A 'base' attachment factor capability of 26 and an 'expanded' attachment factor capability of 24 is standard on all mdls of the 3694. An 'expanded' attachment factor capability of 49 can be obtained by adding feature #1007 with specify #9601.

To determine if feature #1007 with specify #9601 is required, the attachment factor for each device type, function, or feature required must be allocated, one time only, against either the 'base' or the 'expanded' attachment factor sum, but not both. (The 'base' and 'expanded' attachment factor sums must be calculated separately.)

The 'base' attachment factor sum may not exceed 26. If the 'expanded' attachment factor sum is 24 or less, feature #1007 with specify #9601 is not required. If the 'expanded' attachment factor sum is greater than 24, but does not exceed 49, feature #1007 with specify #9601 is required. An 'expanded' attachment factor sum of greater than 49 is not allowed. Maximum: One. Field Installation: Yes.

**Device Attachment Table:** In the following table, attachment factors in the column labeled BASE are applicable to the 'base' attachment factor calculation only. Attachment factors in the column labeled BASE OR EXPANDED are applicable to either the 'base' or 'expanded' attachment factor calculation.

The 3694 loads support for devices/features into control storage in the sequence indicated by the following table. The 3694 will always attempt to load each device or feature into 'base' control storage. If a device or feature is encountered that will not fit into 'base' control storage and it is applicable to 'expanded' control storage, the controller will load it into 'expanded' control storage if space is available.

Refer to the "IBM 3694 Document Processor Description and Configuration", GC31-2009, for a comprehensive list of attachment factors and additional information regarding calculation of base and expanded attachment factors.

A description of attachment factor functions not associated with a specify, machine or feature is given later in this section. See "Attachment Factor Functions".

### Device Attachment Factors Table

Device Type/ Feature/Function	Attachment Factor	
	Base	Base or Expanded
3694 Operator Console	2.8	
SDLC (#4501 or #4502)	0.7	
Multiple Block I/O		
- Diskette	3.0	
Optional		
Instruction Locator	0.3	
Instruction Enhancements	1.7	
3694 Document Processor		
Base (Note 1, 4)		21.5
Alternative Line		
Attachment Base (Note 3)		5.4
Dynamic Control (Note 5)		1.5
SDLC Link Diagnostics		
(Note 3)		0.8
SDLC/SNA Attachment		
Part 1 (Note 3)		8.0
SDLC/SNA Attachment		
Part 2 (Note 3)		5.8
Device Cluster Adapter		
(Note 2)		5.0
LSEKP Instruction (Note 1)		1.8
Translate Instruction		

## MACHINES

(LTRT) (Note 1)	1.2
Data Decompression/ Decompaaction (Note 1)	1.2
Data Compression/ Compaction (Note 1)	1.6
SCRPAD Instruction (Note 1)	1.7
Priority Dispatching (LCHAP) (Note 1)	0.3
Data Sequencing	1.6
Extended Statistical Counter Recording (Note 1)	1.3
Extended Diskette Access Method (EDAM) Base	5.5
EDAM Allocate/Deallocate (LDKT Instruction) (Note 6)	1.7
EDAM Temporary File Support (Note 7)	1.5
3262/3287 Part 1 (Note 2)	3.0
3262/3287 Part 2 (Note 2)	1.5
Set Diskette	0.9

### Notes

1. The Optional Instruction Locator must be included if this function is used. If more than one function requiring the Optional Instruction Locator is used, the attachment factor for the Locator need be included only once.
2. The device cluster adapter, 3262/3287 Part 1, and 3262/3287 Part 2 must be included if a 3262 and/or 3287 is used.
3. The Alternative Line Attachment Base, SDLC Link Diagnostics, SDLC/SNA Attachment Part 1 and SDLC/SNA Attachment Part 2 together comprise the SNA Primary interface support required in the controlling 3694 for controller-to-controller (3694-to-3694) communication via an SNA/SDLC interface. When used, these functions must all be loaded into the same controller storage (i.e., base or expanded). This SNA primary function is used in conjunction with the controller attachment feature (#4401).
4. The 3694 Operator Console function must be included if the 3694 Document Processor Base function is included.
5. The Alternative Line Attachment Base must be included and loaded into the same controller storage (i.e., base or expanded) if Dynamic Control is used.
6. The EDAM Base must be included if the Allocate/Deallocate function is used.
7. The EDAM Base must be included if EDAM Temporary File Support is used.

### ATTACHMENT FACTOR FUNCTIONS

**Data Sequencing:** Allows user applications to sequence, in storage, a block of data items or to collate, in storage, data items from two separate blocks into a third block, according to a parameter list.

**Extended Statistical Counter Recording:** Allows user applications, via the STATS instruction, to access the basic statistical counters of the 3694 and attached devices.

**Set Diskette:** Allows user applications to reset the temporary files, to specify the type of start-up (i.e., warm or cold) to be performed on the next load, and/or to initiate a load of the controller.

**Instruction Enhancements:** Provides the user application with the following instructions:

- Bit Manipulating - Test and Branch (LIFON, LIFOFF) -- provide a test, set and branch function in a single instruction. This reduces the 3600 AP processing and memory requirements when processing single bits.
- Logical Compare Data Immediate (CCDI) -- compares immediate data to data in a specified field.

- Move Data Immediate (MVDI) -- moves immediate data to a specified field.
- Load Data Immediate (LDDI) -- loads immediate data into specified register.
- Scale -- formats an input string of characters into a conveniently processable numerical format. When used in processing monetary input, functions such as the removal of the monetary symbol, commas, and periods from the input data are automatically done. In the event that cents were not in the input data, zero padding is optionally provided. Scale should significantly reduce the number of instructions required to process monetary input.
- Segment Indexing (SETX, TESTX, SETXREG) -- provides an alternate method of referencing data within a segment. Only fixed operands of 3600 instruction may be indexed. This function can be used to reduce the number of SETFPL instructions executed by the AP, thereby enhancing performance and reducing AP size. This function also provides a pseudo DSECT facility, thereby enabling an AP to more readily reference: (1) Variably displaced data within segments and/or (2) data beyond 4K bytes from the beginning of a segment.
- Branch on Index (BRANX) -- provides an index increment, compare and branch function in a single instruction. This instruction is used to control the number of times a series of AP instructions will be executed. Since the instruction algebraically increments a register, BRANX can be used in conjunction with the Segment Indexing facility to simplify the processing of tables.
- Execute (LEXEC) -- provides a function similar to the S/370 EXECUTE instruction. The amount of data logically ORed into the target instruction may be 2, 4 or 6 bytes.

**Priority Dispatching:** Provides the ability to dynamically specify the order in which controller workstations are dispatched. This function consists of the LCHAP instruction which activates or deactivates the dispatching priority specified in the table(s) generated by the PRIDSP configuration macro.

**Translate:** The LTRT instruction processes an input data stream against user-specifiable translate table(s) to generate a translated output data stream. The LTRTBEG, LTRTENT and LTRTGEN instructions assist the user application programmer in specifying the translate table(s).

**Multiple Block I/O - Diskette:** Permits multiple blocks to be accessed with a single execution of the LREAD and REPLACE instruction for permanent file and absolute addressing accesses. This may also result in enhanced performance when more than three blocks are read or four blocks are written.

**Data Compression/Compaction:** This function allows a controller application program to condense a data stream by compressing repeated characters and compacting frequently-occurring characters according to a user-defined table. This can reduce the amount of data actually transmitted over a host link or stored in the controller.

**Data Decompression/Decompaction:** This function allows a controller application program to decompress and/or decompact a data stream which had previously been compressed and/or compacted by a host or a controller application program.

**Extended Diskette Access Method (EDAM) Base:** Provides the capability to open, access and close data sets on the primary or auxiliary diskette drive.

**EDAM Allocate/Deallocate (LDKT Instruction):** Provides, via the LDKT instruction, capability to allocate and deallocate data sets in either the primary or auxiliary diskette drive.

**EDAM Temporary File Support:** Permits processing of a data set defined with a temporary file structure on the auxiliary diskette drive.

**Dynamic Control:** Provides additional LCNTRL instruction functions to assist in controlling access to devices attached to the 3694 through the SNA Primary interface.

**LSEKP Instruction:** Locates a table entry which is 'equal to', 'greater than or equal to', or 'less than or equal to' a search argument using a binary search algorithm. Tables may be included in the instruction section of the controller application program.

**SCRPAD Instruction:** Provides access to optional global work areas distinct from segment storage.

## MODEL CONVERSIONS

3694 model 1s shipped beginning November 13, 1982 can be field upgraded to model 2s. Model 1s shipped prior to November 13, 1982 cannot be upgraded to model 2s but model 2s cannot be field-changed to model 1s. Model 2s can be changed to model 1s at time of manufacture only. Model suffix upgrades and downgrades (e.g., 1A to 1B, 2A to 2B, 1B to 1A, 2B to 2A, etc.), can be field-changed.

## ACCESSORIES

**Belts - Ink Roll - Ribbons:** These accessories may be purchased from IBM or a customer-selected source. Order via MES from plant of manufacture. Allow a lead time of 120 days.

7032508 - MLP/PLP Ribbon-Purple (No Longer Available)  
7032552 - MLP/PLP Ribbon-Blue/Black (No Longer Available)  
7032505 - MLP/PLP Ribbon-Black  
423654 - Endorser Ink Roll-Black  
7034365 - ID Printer Ribbon Assembly  
7032878 - MICR Ribbon  
7032759 - Restraint Belt  
7032760 - Picker Belt  
7032761 - Feed Drum Belt  
7032763 - Read-Head Belt

**Cables:** Cables are provided without charge when EIA Interface (#3701) is ordered. Detailed information about these cables is provided in "IBM 3694 Document Processor Installation Manual - Physical Planning", GC31-2010. See the 3287, 4224, 4234, or 3262 Printers Accessories section for cable attachment to the 3694. Effective April 1, 1984, communication cables and attachment cables will be shipped with the machine. If the 3694 is to attach to or communicate directly with a host system, then #9201 must be specified. The cable will be 40 ft. long. Shorter cable lengths may be ordered by ordering cable group 0681 in lieu of specifying #9201. Allow eight weeks for orders. Field Installation: Yes. Prerequisites: #3701.

If the 3694 is ordered for attachment to another 3694 via the controller attach feature (#4401) then #9202 must be specified. This cable will be 50 ft. long. Shorter or longer cables up to 100 ft. in length may be ordered by ordering cable group 3684 in lieu of specifying #9202. Field Installation: Yes. Prerequisites: #3701.

**Microfilm Cassette - MES Orders (P/N 5682436):** This cassette provides space for both microfilm supply reel and take-up spool. Cassette utilizes standard 16mm supply reels (100-foot or 215-foot film length). Cassette includes one take-up spool.

**Note:** A single cassette is provided with the ordering of the microfilm feature (#5121).

**Documents:** E13B magnetic characters, print quality and code line arrangement on the documents must meet the specifications recommended by the American Bankers Association. Intermixed paper and card documents within the following specifications can be processed:

Length: 146.05 to 225.4mm (5.75 to 8.875 in.)  
Width: 66.68 to 107.95mm (2.625 to 4.25 in.)  
Document Thickness: 0.09 to 0.14mm (0.0035 to 0.0055 in.)

**Carrier Envelope:** Carrier envelopes containing mutilated documents should not exceed total thickness of 0.356mm (0.014 in.).

**Note:** The use of carrier documents may cause a higher than normal jam stop frequency. Base Weights: 75 to 120 grams per square meter (basic weight is the weight of 500 sheets of 17 in. x 22 in. paper), 20 to 32 pounds. Standard column card stock may also be processed (must meet ABA RS-147-R3 specification).

**Note:** Insertion of an occasional 16 pound document is allowed. Insertion of concentrations of 16 pound documents is not recommended.

**Grain:** Preferably long grain.

## SUPPLIES

To ensure that consumables are on-hand when the 3694 is shipped and received at the installation, care should be taken to have the customer submit an order to your DP Supplies Coordinator for 3694 supplies well ahead of installation time. Customer Responsibilities: The customer is responsible for changing all consumable supplies listed above. If the customer desires to have an IBM CE replace or install any of the consumable supplies, the CE time involved will be billed to the customer. Special note should be taken of Section 5, Belts; the customer must be informed of the need to keep spares on hand and have his operators trained in their replacement.

Consult your DP Supplies Coordinator for information regarding the following consumable supplies required for the 3694:

1. Diskettes:  
Diskette 1 (128 Bytes) P/N 2305830  
Diskette 2 (128 Bytes) P/N 1766870  
Diskette 2 (256 Bytes) P/N 2736700
2. Ribbons: Note: Ribbon inks for the Master List Printer and Distribution List Printer ribbons are formulated to minimize printer wire damage.

### Master List Printer Ribbons:

Ribbon - Purple P/N 7032508 (No Longer Available)  
Ribbon - Blue/Black P/N 7032552 (No Longer Available)  
Ribbon - Black P/N 7032505

### Distribution List Printer Ribbons:

Ribbon - Purple P/N 7032508 (No Longer Available)  
Ribbon - Blue/Black P/N 7032552 (No Longer Available)  
Ribbon - Black P/N 7032505

### Sequence Number Printer Ribbon Assembly:

Ribbon Assembly P/N 7034635

### MICR Ribbon:

MICR Ribbon P/N 7032878

3. Endorser and PAID Stamp Ink Rolls:  
Black P/N 423654
4. Endorser Plates: Endorser plates are made to the customer's specifications. See your DP Supplies Coordinator for ordering procedures and prices.
5. Belts:  
Restraint Belt P/N 7032759  
Picker Belt P/N 7032760  
Feed Drum Belt P/N 7032761  
Read-Head Belt P/N 7032763
6. Vacuum Cleaner Supplies:  
Vacuum Bags P/N 7032219
7. Microfilm Lamps:

Package of 4 Lamps P/N 7032252

8. 3694 Customer Convenience Kit: P/N 7032998

Starter Supply Kit, approximately 6 months supply of all consumables. See your DP Supplies Coordinator for details.

9. Paper Specifications:

Master List Printer:

Single-part Fan Fold P/N 7034710  
\*Width: 89mm +/- 1mm (3.5 in.)  
Weight: 16 lb Bond  
Length of Fold: 140mm (5.5 in.)  
Number of Folds/Pack: 500

Master List Printer:

Double-part Roll P/N 7034713  
\*Width: 89mm +/- 1mm (3.5 in.)

Weight: 16 lb Bond  
Max. Dia.: 83mm (3.27 in.)  
Thickness: 0.07-0.20mm (max.) (0.0028-0.0079 in.)

Distribution List Printer:

Single-part roll (only) P/N 7034712  
\*Width: 44.5mm +/- 0.5mm (1.75 in.)  
Weight: 16 lb Bond  
Max. Dia.: 83mm (3.27 in.)  
Thickness: 0.07-0.20mm (max.) (0.0028-0.0079 in.)

\* Use of paper less than 88.9mm (3.5") wide on the MLP and 44.45mm (1.75 in.) wide on the DLP may damage the print mechanism.

**Paper Roll Core:** Paper sensing mechanisms require that the core of the paper roll have an inside diameter of 11.10mm +/- 1.01mm (0.437 in. +/- 0.04 in.) and an outside diameter of 22.25mm +/- 1.01mm (0.875 in. +/- 0.04 in.).

## 3704 COMMUNICATIONS CONTROLLER

**Note:** All Models, RPQs, Special Features and Accessories are NO LONGER AVAILABLE -- Model changes will be withdrawn at a later time.

The 3704 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Cntl	Max* Line	Max Stor	Host Program	Comm Cntl Program
3704	32	64K	BTAM	EP
3705	255	512K	BTAM	EP
-II	352	512K	VTAM/TCAM	ACF/NCP-PEP
3505	16	256K	VTAM/TCAM	ACF/NCP-PEP
-80	16	256K	BTAM	EP
3725	256	1024K	VTAM/TCAM	ACF/NCP-PEP
-1			BTAM	EP
3725	24	512K	VTAM/TCAM	ACF/NCP-PEP
-2			BTAM	EP

\* Maximum lines that can physically attach, CF3705 is required to determine actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

### PURPOSE

The 3704 attaches to any S/370, 30XX, 4300 Processor, or in 2701/2702/2703 Emulation Mode only, to S/360 models 30 (submodels E or F), 40, 50, 65, 67 (in 65 mode), 75 and 195 for communication with local or remote I/O devices over various common-carrier provided or customer-owned communication facilities.

**Note:** See "Programming" and "SCP" pages for attachment capabilities.

### MODELS

The 3704 is available in four models:

Model	Storage (bytes)	Maximum Comm Lines
A1 A01	16K	32
A2 A02	32K	32
A3 A03	48K	32
A4 A04	64K	32

**Prerequisites:** The 3704 requires a control unit position on a processor's Byte Multiplexer Channel. See the machine pages of the processor to which the 3704 will attach.

### HIGHLIGHTS

The 3704 is a modular, programmable unit which greatly expands the communications capabilities of S/360, S/370, 30XX, 4300 Processors. By virtue of its modularity and programmability, the 3704 boasts a high degree of flexibility in tailoring to a teleprocessing system's requirements.

The 3704 is housed in a 36x24x57-inch cabinet which contains the Central Control Unit (CCU), the Control Panel (CP), storage (as indicated above), a Channel Adapter (CA), a Communication Scanner (CS), Line Interface Bases (LIB), and Line Sets (LS) to allow attachment of up to 32 communications lines.

The maximum number of communication lines attachable is a function of the speed of the lines, the CS installed and the mode of operation. An APL Configurator is available to assist in configuring the 3704 to the requirements of a specific TP network.

**Customer Responsibilities:** See the M2700 pages. Also see the 3704/3705 Programming pages for attachment capability, and the host systems programming pages for possible restrictions to the above.

### 3704 Configuration

Standard	Special Features
C C U E O N N N I T T T R R A O L L	Channel Adptr Type 1 (#1541) Two Channel Switch (#8002) TO SYS ATTACH
and	Expan Feat (#3006) Note 1
C U O N N I T T R O L	Comm Scan Type 2 #1642 w/o Comm Scan Exp #9090 LIB in Pos 1 Line Sets
Stor vars w/ 3704 mdl	Bus Mach Clock (#4650) Note 2 TO COMM LINES
	Comm Scan Type 1 #1641 or Comm Scan Type 2 (#1642) w/Comm Scan Exp (#9090) LIB in Pos 2 Line Sets

### Notes:

1. Required for mdls A2, A3 and A4, or CS Type 2 (#1642) on mdl A1.
2. A minimum of one Business Machine Clock (#4650) is required. See "Special Features".

**Communication Facilities:** The 3704 operates over or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

**3704 Local Attachment (Start/Stop):** In addition to terminals being attached to the 3704 through PTT-provided facilities, they may also be connected directly to the 3704 using LS Type 1C (#4713). The cable groups selected from the Physical Planning Manuals or the device must have the 25-pin data set interface. LS Type 1C (#4713) allows only two terminals to be attached; one per 3704 25-pin data set interface. There must be corresponding Business Machine Clocks (BMC) in both the terminal and the 3704.

**3704 Local Attachment (Synchronous):** In addition to the synchronous terminals being attached to the 3704 through facilities, they may also be connected directly to the 3704 using LS Type 1F #4716. The cable groups selected from the Physical Planning Manuals for the device must have the 25-pin data set interface. LS Type 1F #4716 allows only two terminals to be attached; one per 3704 25-pin data set interface. There must be corresponding BMCs in both the terminal and the 3704.

**3704 Line Interface Bases:** Communication lines are attached to the 3704 through 'LIBs', of which there are several different types, to accommodate the various types of line terminations. Depending on type, these LIBs will house from one to eight "Line Sets" each, which will allow the attachment of from one to 16 communication lines. The 3704 will accommodate a maximum of two of these LIBs, allowing up to 32 lines to be attached. Note: The LIB position in the 3704 must be specified. See "LIB Position Designator" following special feature #1642.

**Publications:** S/360 -- GC20-0360; S/370 -- GC20-0001.

## SPECIFY

- Power (AC, single phase): Not recommended for Field Conversion.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
200V #2806	200V #2732
220V #2813	208V #9902
235V #2814	230V #9904

- (Japan only > Specify #2747 to satisfy power requirements. <)
- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white. Field Installation: Not recommended.
- Prior to submitting an MES order, the Branch Manager should be consulted for any software/hardware compatibility requirements resulting from order.
- Cabling: Specify #9080 for below floor, or #9081 for on the floor.
- Language Groups:

English #2927	Japanese #2930
French #2928	Spanish #2931

## Communication Communication Scanner Type 1 (#1641) Scanner Type 2 (#1642)

LIB TYPE	Pos 1	Pos 2	Pos 1	Pos 2
1	-	-	#9501	#9502
1	#9311	#9312	#9511	#9512
8	#9381	#9382	#9581	#9582
10	#9401	#9402	#9701	#9702

The LIBs should be assigned to position in numerical order: that is, LIB Type A1s should be assigned to the lowest numbered positions, LIB Type 1s next lowest, etc., so that the highest type numbered LIB is in the highest numbered position. Each order submitted must indicate the Feature number for each LIB desired plus a location

- (Japan only > Specify code #2946 must be supplied to satisfy NTT's DTE self-test requirements when attaching a non-IBM modem with LSs 1A or 1D. Only one #2946 is required per 3704. <)

## SPECIAL FEATURES

### Non-Communications Features

**Two-Channel Switch (#8002):** (NO LONGER AVAILABLE) Provides for the attachment of a 3704 CA Type 1 (#1541) to two S/360, S/370, 30XX, 4331 or 4334 Processor channels (which may be on the same processor, or on two different processors). The CA so equipped will, however, be capable of operation on only one channel at a time. A manual switch on the CP selects the channel which is to be made operable. Maximum: One. Field Installation: Yes. Prerequisites: #1541.

**Unit Protection (#8510):** (NO LONGER AVAILABLE) Provides a lock on the 3704 which deactivates all switches (except power-off and power-on) when key is removed. Two keys are included. For additional or replacement keys, see "Accessories". Maximum: One. Field Installation: Yes.

### Communications Features

**Channel Adapter Type 1 (#1541):** (NO LONGER AVAILABLE) Provides for communication with a S/360, S/370, 30XX, 4300 Processor Byte Multiplexer Channel. All such communications are accomplished via 1, 2, 3 or 4-byte transfers, with de-selection and re-selection between each transfer. Data transfer rates are primarily dependent on the 3704's internal processing requirements. Maximum: One. Field Installation: Yes.

**Communication Scanner Type 1 (#1641):** (NO LONGER AVAILABLE) Provides the interface between the communication line attachment features and the Central Controller. The CS Type 1 (#1641) uses the 3704 interrupt facilities to allow the program to perform character assembly and disassembly, and allows for program control of line control, control character recognition, code translation and error recovery functions. Limitations: This Scanner may not be installed if a CS Type 2 is to be installed. Maximum: One. Field Installation: Yes. Prerequisites: At least one #4650.

**Communication Scanner Type 2 (#1642):** (NO LONGER AVAILABLE) Provides the interface between the communication line attachment features and the Central Controller. The CS Type 2 (#1642) assembles and disassembles characters automatically, provides character buffering for each line and allows for program control of line control, control character recognition, code translation and error recovery functions. The basic scanner is operational with one LIB Type A1 only. Limitations: This scanner may not be installed if a CS Type 1 is to be installed. Maximum: One. Field Installation: Yes. Prerequisites: At least one #4650 and #3600. Specify: CS Expansion (#9090) to permit installation of two LIBs of any types except two LIB Type 1s (#4701).

**LIB Position Designator:** The position of the LIBs within the 3704 must be specified in accordance with the table below:

specify code (position number, from above table) based on the LIB Type.

The positions of the line sets within the LIB will be automatically assigned.

**Cables:** The cables that are included in each line set are listed in the "IBM Input/Output Equipment Installation Manual - Physical Planning", GC22-7064.

To obtain cables longer than 15 meters (50 feet), select the required cable below and order the cable assembly P/N and the required cable length in meters. These longer cables are ordered by P/N on (Except Canada>an MES.<) (Canada only>cable order Form 2642.<) The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the (Except Canada>QSLM file<) (Canada only>FED parts price list <) for prices.

To order a cable for a RS-232-C/CCITT V.24 Modem Interface Attachment:

Duplex (Line Set Type 1H #4714)  
Order cable assembly P/N 1785928 (See Note 1)  
Half Duplex (Line Set Type 1D #4714)  
Order cable assembly P/N 1785929 (See Note 1)

To order a cable for a Autocall Originate (RS-366-A/CCITT V.25) Attachment:

(Line Set Type 1E #4715)  
Order cable assembly P/N 1753439 (See Note 2)

Note 1: Maximum Length: 30 meters (100 feet).  
Note 2: Maximum Length: 45 meters (150 feet).

**Expansion Feature (#3600):** (NO LONGER AVAILABLE) Required for mdls A2, A3, and A4 or CS Type 2 (#1642) on mdl A1. Maximum: One. Field Installation: Yes.

**Business Machine Clock (#4650):** (NO LONGER AVAILABLE) Provides clocking when the attached external CCITT modem or internal IBM line adapter does not provide this clocking. The speed of this clocking must be specified for each Business Machine Clock (#4650) ordered from the following table:

Speed (bps)	Specify
75	#9604 - for WT Teleprinters
100	#2716 - for WT Teleprinters

**Limitations:** Required only when modem does not provide clocking except that each CS requires at least one BMC, which must be at a speed less than one-half that of the lowest speed modem clocked line. Maximum: Four per CS Type 1 (#1641) or Type 2 (#1642). Field Installation: Yes. Prerequisites: #1641 or #1642. Note: Individual BMCs may be assigned by the program to one or more communication lines.

**Line Interface Base Type A1 (#4700):** (NO LONGER AVAILABLE) For attachment of up to four LSs 1A, 1C, 1F, 1E, or 1D in any combination.

**Limitations:** See CS Type 2 (#1642). When installed in combination with other type LIBs, the maximum of two applies to the total number of LIBs. Maximum: Two if CS Expansion (#9090) is specified with CS Type 2 (#1642). Without (#9090), maximum is one. Field Installation: Yes. Prerequisites: #1642.

**Line Interface Base Type 1 (#4701):** (NO LONGER AVAILABLE) Provides for the attachment of up to eight LS 1A, 1C, 1D, 1F. Limitations: When installed in combination with other type LIBs, the maximum of two applies. Maximum: Two with CS Type (#1641); one with CS Type 2 (#1642). Prerequisites: #1641 or #1642 with #9090. Field Installation: Yes.

**Line Interface Base Type 8 (#4708):** (NO LONGER AVAILABLE) Provides for the attachment of up to two Modem Attachment Bases - 1200 bps (#5103). Limitations: When installed in combination with other type LIBs, the maximum of two applies. Maximum: Two per 3704. Field Installation: Yes. Prerequisites: #1641 or #1642 with CS Expansion (#9090).

**Line Set Type 1A (Low-Speed External Line Interface) (#4711):** (NO LONGER AVAILABLE) Provides for the attachment of two start/stop communication lines at speeds up to 600 bps or at 1200 bps on nonswitched lines equivalent to two CCITT M 1020 lines in tandem. Limitations: When installed in combination with other type LSs, the maximum above applies to the total number of LSs. Maximum: Eight per LIB Type 1 (#4701), or four per LIB Type A1 (#4700). Field Installation: Yes. Prerequisites: #4701 or #4700 and a Business Machine Clock (or clocks) (#4650), assigned by the program to this LS.

**Line Set Type 1C (Low-Speed Local Attachment) (#4713):** (NO LONGER AVAILABLE) Provides for the local attachment of two half-duplex IBM Start/Stop terminals at speeds up to 1200 bps via IBM-provided cables. Modems are not required. Note: The attached terminal must provide a BMC and external modem cable to which the 3704 LS 1C cable will connect. Total cable length must not exceed 200 feet. Limitations: When installed in combination with other type LSs, the maximum above applies to the total number of LSs. Maximum: Eight per LIB Type 1 (#4701), or four per LIB Type A1 (#4700). Field Installation: Yes. Prerequisites: #4701 or #4700 and a Business Machine Clock (or clocks) (#4650) specified for the same speed as the terminal's clock.

**Line Set Type 1D (Medium-Speed External Line Interface) (#4714):** (NO LONGER AVAILABLE) Provides for the attachment of two start/stop communication lines at speeds up to 600 bps or at 1200 bps on nonswitched lines equivalent to two CCITT M 1020 lines in tandem, or synchronous communication lines at speeds up to 7200 bps, each of which has a CCITT V.24 interface for attachment to an external modem. Limitations: When installed in combination with other type LSs, the maximum above applies to the total number of LSs. Maximum: Eight per LIB Type 1 (#4700) or four per LIB Type A1 (#4701). Field Installation: Yes. Prerequisites: #4701 or #4700. Note: For speeds in excess of 4800 bps, see Address Substitution under "Specify". Prerequisites: #4701 or #4700.

**Line Set Type 1F (Medium-Speed Local Attachment) (#4716):** (NO LONGER AVAILABLE) Provides for the local attachment of two half-duplex, synchronous IBM terminals at speeds up to 2400 bps via IBM-provided cables. Modems are not required. This LS requires different cable groups depending upon terminal type. For cabling information, see "IBM System/370 Installation Manual - Physical Planning", GC22-7004; for Remote, see "Multiplexers", GA27-3006. Note: The attached terminal must be equipped with a BMC, and must provide a standard external modem cable to which the 3704 LS 1F external cable will connect. Total cable length must not exceed 100 feet. Limitations: When installed in combination with other LSs, the maximum below applies to the total number of LSs per LIB. Maximum: Eight per LIB Type 1 or four per LIB Type A1. Field Installation: Yes. Prerequisites: #4701 or #4700 and a Business Machine Clock (or clocks) (#4650) specified for the same speed as the terminal's BMC.

**Line Set Type 8A (1200 bps Leased Integrated Modem) (#4781):** (NO LONGER AVAILABLE) Provides for the attachment of one start/stop line up to 600 bps or one synchronous line at 1200 bps. This line set includes one 1200 bps Integrated Modem. No external modems are required. This integrated modem must communicate with another 1200 bps Integrated Modem. Limitations: Maximum: Two per Modem Attachment Base - 1200 bps (#5103). Field Installation: Yes. Prerequisites: #5103 and a Business Machine Clock (#4650) assigned by the program to this LS. Specify: (Japan only) Specify Code #2943 must be ordered when attaching to the NTT D-1 service.

**Modem Attachment Base 1200 bps (#5103):** (NO LONGER AVAILABLE) Provides for the attachment of up to two of LSs 8A (in any combination). Maximum: Two per LIB Type 8 (#4708). Field Installation: Yes. Prerequisites: #4708.

## MODEL CONVERSIONS

May be made in the field.

**MACHINES**

**ACCESSORIES (NO LONGER AVAILABLE)**

(stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

**Keys:** A 3704 with Unit Protection (#8510) is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number

**SUPPLIES (NONE)**

## 3705 COMMUNICATIONS CONTROLLER

### THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

(3705-I Models A, B, C, D are no longer available).  
ALL MODELS OF THE 3705-II ARE WITHDRAWN FROM MARKETING

Orders for Model Changes, Features, RPQs and Accessories will continue to be accepted until July 23, 1986.

The 2705 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Cntrlr	Max* Line	Max Stor	Host Program	Comm Cntrl Program
3705-II	255 352	512K 512K	BTAM VTAM/TCAM	EP ACF/NCP-PEP
3705-80	16 16	256K 256K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3704	32	64K	BTAM	EP
3725-1	256	1024 K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	24	512K	VTAM/TCAM BTAM	ACF/NCP-PEP EP

\* Maximum lines that can physically attach, CF3705 is required to determine actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

### PURPOSE

The 3705-II attaches to all S/370, 30XX, 4331, 4341, or 9370 Processors or, in 2701/2702/2703 Emulation Mode only, to S/360 models 40, 50, 65, 67 (in 65 mode), 75 and 195 for communication with local or remote I/O devices over various PTT-provided or customer-owned communication facilities.

### MODELS E-L

The 3705 consists of the following models based on either the number of frames and/or the storage capacity:

Model	Storage
E1, F1, G1, H1	32K
E2, F2, G2, H2	64K
E3, F3, G3, H3	96K
E4, F4, G4, H4	128K
E5, F5, G5, H5	160K
E6, F6, G6, H6	192K
E7, F7, G7, H7	224K
E8, F8, G8, H8	256K
J1, K1, L1	320K
J2, K2, L2	384K
J3, K3, L3	448K
J4, K4, L4	512K

3705-II models E01 through H08 consists of monolithic storage with a cycle time of 1.0 microseconds. 3705-II models J01 through L04 consists of monolithic storage with a cycle time of 900 nanoseconds.

The model numbering of the 3705 is 'x' 'y'. The 'x' is an alpha code designating the number of frames in a 3705; E represents one

frame, F or J two, G or K three, and H or L is four frames for 3705-II; 'y' is numeric code designating the storage size.

In the 3705-II (models E, F, G and H), the storage is housed only in the first frame, which has up to eight increments of monolithic storage. The 3705-II, models J, K and L have 256K of storage in the first frame and 64K in the second frame. Additional storage in 64K increments may be installed in the second frame for a maximum of 512K bytes.

**Prerequisites:** The APL Configurator (AID CF3705) must be used to prepare the DP Order.

### Host Processor Attachments

The 3705-II requires a control unit position on a system channel, unless only the Remote Program Loader (RPL) feature is installed.

**S/360 mdls 40, 50:** Multiplexer Channel (standard). Attachment to S/360 is in 2701, 2702, 2703 emulation mode only.

**S/360 mdls 65, 67 (65 mode), 75, 195:** Multiplexer Channel of 2870. See M2870 pages. Attachment to S/360 is in 2701, 2702, 2703 emulation mode only.

**S/370 mdls 115, 125:** Multiplexer Channel (special feature). See M3115, M3125 pages.

**S/370 mdl 135:** Byte Multiplexer Channel (standard), Selector or Block Multiplexer Channel (special features). See M3135 pages.

**S/370 mdl 135-3:** Byte Multiplexer Channel (standard), or Block Multiplexer Channels (special feature). See M3135-3 pages.

**S/370 mdl 138:** Byte Multiplexer Channel (standard), or Block Multiplexer Channels (standard). See M3138 pages.

**S/370 mdl 145:** Byte Multiplexer or Selector Channel (standard), or Block Multiplexer Channel (special feature). See M3145 pages.

**S/370 mdl 145-3:** Byte Multiplexer Channel (standard), or Block Multiplexer Channels. See M3145-3 pages.

**S/370 mdl 148:** Byte Multiplexer Channel (standard), or Block Multiplexer Channels (standard). See M3148 pages.

**S/370 mdls 155, 155-II, 158 and 158-MP:** (158 submodel 2 in Japan only) Byte Multiplexer or Block Multiplexer Channels (standard). See M3155, 3158 pages.

**S/370 mdls 165, 165-II, 168, 168-MP, and 195:** Selector Channel of 2860, Multiplexer Channel of 2870. Selector Subchannels (special features) of 2870, or Block Multiplexer Channel of 2880. See M2860, 2870, 2880 pages.

**3031 Processor:** Byte Multiplexer Channel (one is standard), Block Multiplexer Channels (five are standard). See M3031 pages.

**3032 Processor:** Byte Multiplexer Channel (one is standard), Block Multiplexer Channels (five are standard). See M3032 pages.

**3033 Processor:** Byte Multiplexer Channels (two are standard), Block Multiplexer Channels (ten are standard). See M3033 pages.

**3081, 3083, 3084 Processor:** Byte Multiplexer Channels, Block Multiplexer Channels. See M3081, 3083, 3084 pages.

**3090 Processor:** Byte Multiplexer Channels --- see M3090 pages.

**4331 Processor:** Byte Multiplexer Channel (special feature). See M4331 pages.

**4341 Processor:** Byte Multiplexer Channel (standard). See M4341 pages.

**9370 Processor:** Byte Multiplexer Channel (#6003). EP and PEP modes are not supported.

**Note:** The 3705-II attaches to a S/360 with a minimum of 128K bytes of storage.

**Note:** See "Programming" and "SCP" pages for attachment capability.

### HIGHLIGHTS

A modular, programmable unit which expands the communications capabilities of S/360, S/370, 30XX, 4331 or 4341 Processors. By virtue of its modularity and programmability, the 3705 boasts a high degree of flexibility in tailoring to a teleprocessing system's requirements. Also, it can relieve the Processor of many TP functions, including, but not limited to, line control, polling, addressing, code translation and error recovery. The maximum number of communication lines which can be physically attached to a 3705 is 352 lines; but, the maximum number of communication lines capable of concurrent operation is a function of the speed of the lines, the type of Channel Adapter (CA), memory size, the Communication Scanner (CS) installed and the programming mode of operation. The maximum number of lines which can be physically installed can exceed the operational capability, see "Specify" for "special scheduled" systems. The 3705-II mdls E01 through H08 have a 1.0 microsecond storage cycle time, the 3705-II mdl J01 through L04 have a 900 nanosecond storage cycle time.

The 3705-II mdls J, K, and L require ACF/NCP/VS Release 2 and all following releases unless otherwise specified.

- **Communication Facilities:** The 3705 operates over PTT -provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.
- **3705 Local Attachment (Synchronous):** In addition to the synchronous terminals being attached to the 3705 through PTT -provided facilities, they may also be connected directly to the 3705 using LS Type 1D (LS1D) (#4714). In addition to the synchronous terminals being attached there must be corresponding Business Machine Clocks (BMC) in both the terminal and the 3705.
- **3705 Local Attachment (V.35):** Terminals may be attached locally to the 3705 using LS1W (#4727) (half-duplex) or LS1Z (#4728) (duplex) V.35 interfaces. No BMC is required in the attached device since clocking signals are provided by BMC(#4651) in combination with (#4727) or (#4728).

**Customer Responsibilities:** See M2700 pages. See also the 3704/3705 Programming pages for attachment capability and refer to Host Systems Programming pages for possible restrictions to the above attachments.

**Machine Organization:** The basic machine consists of the Central Control Unit (CCU) with storage (32K in the 3705-II) and an operator's control panel.

A minimum machine configuration must have, in addition to the base unit, the following features:

1. Either a Channel Adapter (CA) feature or the Remote Program Loader (RPL) feature. The CA requires different levels of processing overhead and thus yield different performance capabilities.
2. A Communication Scanner (CS) feature to provide for the connection between the Attachment Base (AB) feature and the Line Interface Base(s) (LIBs) features. Like the CAs, the various CSs have varying degrees of performance due to the different levels of processing overhead.
3. An AB which provides a common connection between the CSs and the CCU.
4. A LIB which provides the connection between the CS and the various LSs. The LIB provides the hardware for the mounting

of the individual LSs. Each LIB is designed for a certain set of functions in conjunction with the various LS.

5. A LS which provides the electronics and external cables to interface to a communication facility.

**Note:** Both the external cables and the LSs are individually ordered. The number of LSs that can be contained in a LIB is contingent upon the electronic hardware of the LS required to perform the functions supporting the communications facilities. See Figure 3.

6. A BMC which provides clocking of data in and out of CS.

**Attachment Bases:** The Attachment Base (AB) provides the physical and logical connection between the CA1 and the CCU, and between the CCU and the various CSs. There are two ABs. A 3705 must have at least one AB, and in some instances have two ABs.

**Channel Adapter:** The CA provides the logical interface between a 3705 and with defined host processor. Every 3705 must have at least one CA in the first frame (except those units having the RPL (#6260). CA1 can only be placed in the first frame of a 3705. When the second CA is a Type 2 or Type 3, then "ROS Substitution" must be specified on the first frame (3705), specify #9754. When there are two or more CA4s and the ACF/NCP/VS Program Product or EP/VS with PRPQ #P85032 is installed, then "N ROS Substitution" must be specified in every frame in which a CA4 is present, specify #9566.

When ordering or removing a CA, use the specify to indicate total number of CAs in the 3705 and 3706 combined and place this specify on the first 2 frames (3705 and first 3706).

if 1 CA, specify #9201

if 2 CAs, specify #9202

if 3 CAs, specify #9203

if 4 CAs, specify #9204

These "specifies" are required on the first two (2) frames whenever a CA is added to or removed from either frame.

**External Cables:** All CAs need external cables which must be ordered separately from the CA features. Limitations and Prerequisites: The 3705-I (first frame) can contain one CA Type 1, 2, 3, or 4. The 3706 (second frame) can contain one CA Type 2, 3, or 4.

3705-II (first frame) can contain two CSs. The 3706 (second frame) can contain two CSs.

When operating with ACF/NCP/VS the 3705-II (first frame), can contain two CAs. The 3706 (second frame) can contain two CAs. If two CSs are in one frame (3705-II), at least one of the adapters must be CA4. When operating with greater than one CA4 and EP/VS with PRPQ #P85032, two CA4s can be in the same frame. Note: EP 3.0 standalone only supports one CA4 in each frame.

No CSs are allowed in the third or fourth frame.

The CSs can be mixed with the following exceptions:

- When CA4 is in the same machine with either a CA2 or a CA3, then the CA4 would be in the first frame.
- The CA1 cannot be in a machine with either a CS3, CS3HS, or CA4. The CA1 is not available on a 3705 mdl J, K, or L.
- Emulation Mode requires either a CA1 or a CA4 connected to a byte multiplexer channel.
- CA2 and CA3 are used only with Network Control mode of the Network Control Program.
- For the 3705-II, if greater than two CAs are installed, the CAs must all be CA4s. Up to four CA4s are allowed.
- For the 3705-II, up to four I/O Channel Attachments are allowed (two per frame).
- For the 3705-II, Remote Program Load-II Feature (#6261) can coexist with a CA.

- For the 3705-II, if two CAs in the same frame, then no Two-Channel Switch (#8002) is allowed.
- Dual ROS need not be removed when total CAs are reduced to a single CA in the entire machine.

CA1 requires the AB1 as a prerequisite. CA2, CS3, and CS4 contain the AB function within their respective features.

**Placement of various RPL/CA and CA configurations:**

3705-II			
3705		3706	
LIB Pos 3.	LIB Pos. 2	LIB Pos. 3	LIB Pos. 2
RPL CA-4 (B1)	(A1)	(B1)	(A1)
LIB Pos. 4 CS-3 CS-3HS (B2)	LIB Pos. 1 (A2)	LIB Pos. 4 CS-3 CS-3HS (B2)	LIB Pos. 1 (A2)
CCU (B3)	CS-2 CS-3 CS-3HS (A3)	LIB Pos. 5 (B3)	CS-2 CS-3 CS-3HS (A3)
CCU (B4)	CA-1 CA-2 CA-3 CA-4 (A4)	CA-4 LIB Pos 6. (B4)	CA-2 CA-3 CA-4 (A4)

**Note:** CS-3 takes two positions.

**Allowable Hardware Channel Adapter Combinations:**

1	2	3	4											
s	n	r	t	R										
CA	d	d	h	O	Frame	Location							ROS	
CA	CA	CA	CA	S	1st	2nd	3rd	4th					Spclf	y
----	Types	----			CA	CA	CA	CA					Code	
1**	-	-	1		3705	-	-	-					-	
1**2	-	-	Dual		3705	3706	-	-					#9754	
1**3	-	-	Dual		3705	3706	-	-					#9754	
2	-	-	2		3705	-	-	-					-	
2	2	-	-	Dual	3705	3706	-	-					#9754	
2	3	-	-	Dual	3705	3706	-	-					#9754	
3	-	-	2		3705	-	-	-					-	
3	2	-	-	Dual	3705	3706	-	-					#9754	
3	3	-	-	Dual	3705	3706	-	-					#9754	
4	-	-	1		*3705	-	-	-					-	
4	2	-	-	Dual*	3705	3705	-	-					#9754	
4	2	-	-	Dual*	3705	3706	-	-					#9754	
4	3	-	-	Dual*	3705	3706	-	-					#9754	
4	4	-	1		*3705	3705	-	-					-	
4	4	-	1		*3705	3706	-	-					-	
4	4	-	N		*3705	3705	-	-					-	
4	4	-	N		*3705	3706	-	-					-	
4	4	4	-	N	*3705	3705	3706	-					#9566	
4	4	4	-	N	*3705	3706	3706	-					#9566	
4	4	4	4	N	*3705	3705	3706	3706					#9566	

\* Not available on a 3705-II J, K, L Models.

\*\* Available only on 3705-II.

**Definition of the different ROS types:**

- "1" ROS type 1 is used to IPL over one channel either a CA1 or CA4. In addition, when 2 CA4s are installed, the IPL Source Switch must be used to select which channel is to do the IPL with a ROS type 1. No specify code is required for ROS type 1. See N ROS to allow for IPL over any CA4.
- "2" is used to IPL over only one channel, either a CA2 or CA3. No specify code is required for the Type 2 ROS.
- DUAL ("ROS Substitution") is used to IPL over one of two channels, using any appropriate combination shown above. Specify code #9754 is required for DUAL ROS.
- N ("N ROS SUBSTITUTION") to be used only with CA4s. ACF/NCP/VS, or EP/VS allows for IPL over any CA4. (PRPQ #85032 is needed to go beyond 2 CA4s in EP). Specify code #9566 is required for "N" ROS.
- RPL is used to IPL remotely. There is a separate ROS for the 3705-II remote. (Although remote is not mentioned on this page, it is listed here for convenience). No specify code is required for RPL ROS.

**Allowable Hardware Channel Adapter Combinations with RPL/CA Installed:**

3507-II only										Frame Location		
R	P	L	1	2	3	s	n	r	t	CA	CA	CA
CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	1st	2nd	3rd
Types	Types	Types	Types	Types	Types	Types	Types	Types	Types	CA	CA	CA
1	1	-	-	RPL/1	3705	3705	-	-	-	-	-	-
1	1	2	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	1	3	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	2	-	-	RPL/2	3705	3705	-	-	-	-	-	-
1	2	2	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	2	3	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	3	-	-	RPL/2	3705	3705	-	-	-	-	-	-
1	3	2	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	3	3	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	4	-	-	RPL/1	3705	3705	-	-	-	-	-	-
1	4	2	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	4	3	-	RPL/Dual	3705	3705	3706	-	-	-	-	-
1	4	4	-	RPL/N	3705	3705	3706	-	-	-	-	-
1	4	4	4	RPL/N	3705	3705	3706	3706	-	-	-	-

**Communication Scanner Features:** The CS features provide the common logical connection between the various LIBs with their respective LSs and the CCU. Each frame of a 3705 must have a CS if LSs are placed within the frame. There are three CSs, each with a different performance capability.

**Limitations:**

- One CS per frame. CS2 and CS3 can be placed within a 3705 in any combination.
- A CS1 (#1641) can only be placed in the first frame of a 3705-I (cannot be placed in a 3705-II).
- CS1 cannot be in a 3705 with a CS3 or CS3.
- Each CS1 or CS2 must have at least one BMC, but not more than four BMCs. CS3 must have at least one BMC (specify #9615), and may have one additional clock (specify #9609 or #9610).
- CS3 only supports attachment of LIBs 1, 8 and 10.
- CS3 cannot be in the first frame of a 3705-I.



7. A CS is required in a frame containing LIBs.
8. CS1 (#1641), cannot be installed with the NCP/VS Program Product.
9. CS3HS must have BMC, specify (#9615); no other clock is allowed.
10. CS3HS allows for the attachment of only LS1GA (#4722) or LS1TA (#4723).
11. Address Substitution is not allowed in a 3705 with a CS3HS (#1644). HSS is not allowed in conjunction with LS1GA and/or LS1TA.
12. The CS3 does not support Tributary support in EP 3.0.

Prerequisites: CS1 must have an AB1 in the 3705. CS2 and CS3, and CS3HS must have an AB2 in the 3705. A CS located in a particular frame requires a CS in each preceding frame. Field Installation: All scanners can be field installed.

**Line Interface Base (LIB):** LIBs are used to provide for the physical attachment of LSs in the 3705. LIB Type 1 must be placed in LIB position 1 if Address Substitution or HSS is to be required in the 3705. The LIBs with the highest speed lines should be placed in the lowest LIB positions (Position 1 is the lowest).

#### Maximum LIB Attachment Capability per Module - Figure 1

3705-I					
	1st	2nd	3rd	4th	Notes
	Modules				
CS 1	4	N/A	N/A	N/A	1
CS 2	4	6	6	6	1
CS 3	N/A	4	4	4	2

3705-II					
	1st	2nd	3rd	4th	Notes
	Modules				
CS 2	4	6	6	6	3
CS 3	3	4	4	4	2
CS 3HS	1	1	1	1	

#### Notes:

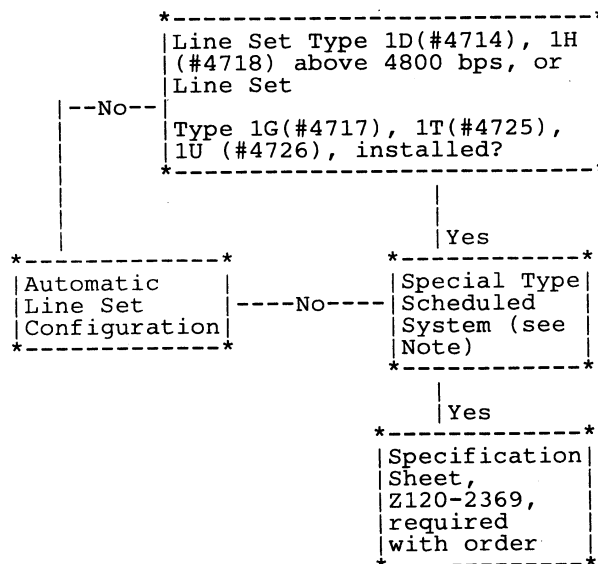
1. LIBs 1 through 12 can be attached to CSs Types 1 and 2 on the 3705-I.
2. LIBs 1, 8 and 10 will attach to the CS3 on the 3705-I or 3705-II (excluding LSs 1A, 1B and 1C).
3. LIBs 1 through 12 will attach to the CS2 on the 3705-II.
4. LIB capacity is limited by the number of CAs and/or the RPL feature. See RPL/CA Placement chart for available LIBs.
5. LSs operating over 10K bps must be in LIB position 1.

**Limitations:** When installed with other LIBs of the same or different type, the maximum cannot be exceeded. There are no restrictions on intermixing LIBs. Prerequisites: A CS is required in each frame containing LIB(s). Field Installation: All LIBs are field installable.

The LIBs must be assigned to a position in numerical order: that is, LIB Type 1s must be assigned to the lowest numbered positions, LIB Type 2s next lowest, etc., so that the highest type-numbered LIB is in the highest numbered position. The order as submitted then must specify a feature code and location specify code for each LIB to be installed.

The positions of the LSs within the LIB will, in most cases, be automatically assigned. To determine whether this automatic assignment is applicable, use the following flowchart: (Normally the Specification Sheet, Z120-2369, should be used only if required by the flowchart below. If, however, specific positions for LSs are de-

sired, even when the Automatic LS Configuration is suggested, fill out the Specification Sheet and submit it).



**Note:** A "Special Type Scheduled System" is one in which the 3705 is effectively servicing two different TP networks on a scheduled basis. That is, one set of communication lines is serviced in one time period and a second set of lines is serviced in a second time period and there is no overlap of the two systems in time.

**Line Sets:** LSs provide the electronic logic to meet the individual requirements of the communication facility. (See Figures 2 and 3 for attachment capability of LSs with respect to LIBs).

**Note:** All LSs require cables. See "Cables" for further details. The numeric portion of the LS type number indicates the LIB type. Each LS type shown is for only one LS.

Figure 3: LIB-Line Set Configuration Chart

Partition within LIB		1	2	3	4
Line Interface Address		0,1	2,3	4,5	6,7
LINE SETS					
Type	Description				
1D	HALF DUPLEX Low and Med. Speed External Modem	x	x	-	-
1D	DUPLEX Low and Med. Speed External Modem	T	R	-	-
1D	DIRECT ATTACH Synchronous	x	x	-	-
1E	Autocall Originate	A	A	-	-
1G	High-Speed External Modem	x	.	-	-
1GA	High-Speed External Modem	x	.	-	-
1J	External Mil Std 188 External Modem	x	.	-	-
1N	CCITT X2.1 Non-Switched - half				

				LINE SETS	
				Type	Description
1N	duplex - Medium Speed - SC 9842 CCITT X.21 Non-Switched - half	x x - - - - -		1D	HALF DUPLEX Low and Med. Speed External Modem
1N	duplex - High Speed - SC 9843 CCITT X.21 Non-Switched -	x . x x - - - -		1D	DUPLEX Low and Med. Speed External Modem
1N	duplex Medium Speed - SC 9842 CCITT X.21 Non-Switched -	T R - - - - -		1D	DIRECT ATTACH Synchronous
1R	duplex High Speed - SC 9843 CCITT X.21	T . R . - - - -		1E	Autocall Originate
1R	Switched duplex Medium-Speed - SC 9840	T R - - - - -		1G	High-Speed External Modem
1R	CCITT X.21 Switched duplex High-Speed - SC 9841	T . R . - - - -		1GA	High-Speed External Modem
				1J	External Mil Std 188 External Modem
				1N	CCITT X2.1 Non-Switched - half duplex - Medium Speed - SC 9842
1T	High Speed /1U Duplex External Modem	T . R . - - - -		1N	CCITT X.21 Non-Switched - half duplex - High Speed - SC 9843
1TA	High-Speed Duplex External Modem	T . R . . . . .		1N	CCITT X.21 Non-Switched - duplex Medium Speed - SC 9842
1W	High Speed Local Attachment w/o Modem HDX data	x . - - - - -		1N	CCITT X.21 Non-Switched - duplex High Speed - SC 9843
1Z	High Speed Local Attachment w/o Modem DPX data	T . R . - - - -		1R	CCITT X.21 Switched duplex Medium-Speed - SC 9840
2A	Telegraph Single Current	x x - - - - -		1R	CCITT X.21 Switched duplex High-Speed - SC 9841
3A	Limited Distance Type 1 Line Adapter 2-wire	x x - - - - -		1S	CCITT V.35 Interface
3B	Limited Distance Type 1 Line Adapter 4-wire	x x - - - - -		1T	High Speed /1U Duplex External Modem
8A	1200 bps Leased Integrated Modem	x x - - - - .		1TA	High-Speed Duplex External Modem
8B	1200 bps Switched Integrated Modem	x x x x x x . .		1W	High Speed Local Attachment w/o Modem HDX data
9A	1200 bps Switched Integrated Modem with Autocall Originate	x A x A . . . .		1Z	High Speed Local Attachment w/o Modem DPX data
10A	1200 bps Leased Duplex Data Integrated Modem	T R - - - - -		2A	Telegraph Single Current
Partition within LIB				3A	Limited Distance
Line Interface Address					

	Type 1 Line Adapter 2-wire	- - - - -
3B	Limited Distance Type 1 Line Adapter 4-wire	- - - - . . . .
8A	1200 bps Leased Integrated Modem	. . . . .
8B	1200 bps Switched Integrated Modem	. . . . .
9A	1200 bps Switched Integrated Modem with Autocall Originate	. . . . .
10A	1200 bps Leased Duplex Data Integrated Modem	- - - - . . . .

**Note:** If the line speed is over 10K bps, the LS must reside in line address positions 0, 2, 4 or 6 when attached to CS2 or reside in line address positions 0, 2, 4, 6, 8, A, C, or E when attached to CS3. Over 10K bps, the LSs must reside in the first LIB, when attached to CS2 or CS3.

**Note:** See Scan Limits, Address Substitution, and HSS under "Specify".

#### LEGEND:

- A: Denotes an Autocall interface.
- X: Denotes a transmit/receive address for a half-duplex line if installed.
- .. Denotes an unused and unavailable address.
- .- Denotes an unused and available address.
- TR: Denotes a Transmit Receive line pair; uses two adjacent addresses.
- T.R.: Denotes a Transmit Receive line pair; uses two adjacent even addresses.

**Publications:** GC20-0001

#### SPECIFY

- All 3705-1Is are to be ordered as follows:
  - "E" mdl's - order one 3705 mdl E1 through E8.
  - "F or J" mdl's - order one 3705 (any F or J mdl) and one 3706 (mdl code same as 3705) with #9755 to designate first 3706.
  - "G or K" mdl's - order one 3705 (any G or K mdl) and two 3706s (mdl code same as 3705). Each 3706 must be ordered separately. On one 3706 order, specify #9755 to designate the first 3706 and on the other one, specify #9756 to designate second 3706.
  - "H or L" mdl's - order one 3705 (any H or L mdl) and three 3706s (mdl code same as 3705). Each 3706 must be ordered separately. On one 3706 order, specify #9755 to designate first 3706, on another 3706, specify #9756 to designate second 3706 and on third 3706, specify #9757 to designate the third 3706.
- Note:** The 3706 type number is to be specified at no charge, and is to be used only for internal IBM ordering and control purposes. Order the 3705 and each 3706 separately with all its associated features. Specify items for voltage, color, and cabling must be ordered on the 3705 and each 3706. The 3706 type number should never appear on any agreement.

**Note:** When doing a model conversion, the Mdl I Frame Specify Code must translate to a Mdl II Frame Specify Code. The position must not be changed.

Position	Mdl I	Mdl II
2	#9751	#9755
3	#9752	#9756
4	#9753	#9757

For Power Compatibility: RPO S30251 (no charge) must be ordered with a 3706, if the 3705 to which it will attach is installed and has a serial number higher than 40000; otherwise, specify #9820.

When transferring a 3706 in the field from a 3705 with a serial number lower than 40000 to a 3705 with a serial number higher than 40000, RPO S30251 and removal of specify code #9820 must be ordered for the 3706.

When transferring a 3706 in the field from a 3705 with a serial number higher than 40000 to a 3705 with a serial number lower than 40000, specify code #9820 and removal of RPO S30251 must be ordered for the 3706.

**Note:** The above will result in appropriate installation and removal of B/M 1644026, which is required on 3706s with serial numbers lower than 50000 only when attached to a 3705 with a serial number higher than 40000.

**3705 Feature Change:** To relocate LSs and/or LIBs from one frame to another on a leased machine, concurrently submit a MES order for each frame, and specify #9544 on any order which contains reinstallations. Because specify code #9544 cause all LSs and LIBs on an order to be shipped as documents only, any outright adds should be ordered on a separate order than one containing specify code #9544. The LIB positions must be kept contiguous on each frame.

To relocate a LIB (and its associated LSs) within the same frame on a leased machine, indicate removal of that LIB position code, and indicate add of the desired LIB position code. Specify code #9544 is not required for reinstallations within the same frame.

If non-standard LS positioning is desired, specify #9545, submit a specification sheet (Form Z120-2369) and indicate same to the system when entering the order.

**Note:** An MES may be a mix of LSs and/or LIB moves, moves within the same frame, moves to and/or from other frames in the same machine. If a specification sheet is submitted, enter the installed LIBs and LSs in the "F/C" column, enter the Add F/Cs in the "Required" column, and enter the Remove F/Cs in the "Not Required" column.

- Power (AC, 3-phase, 4-wire):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

Field Conversion: Yes (Except 200V, or frequency conversion.)

- Power Requirements: Specify #2747 for Machines to be installed in Japan.
- (Canada only) > If a 4.3 meter (14 feet) cable is not required, specify #9986 for 1.8m (6 ft) cable. <
- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, or #9046 for white. Not recommended for field installation.
- Address Substitution/Upper Limit Scan: For 3705s with a CS2, there are two methods of address modification: Upper Scan Limits and Address Substitution, which allow the CS2 to operate a line set at speeds greater than 4800 bps. For information

on USL, see the "IBM 3704 and 3705 Principles of Operation", GC30-3004.

Address Substitution (#1201, #1202, #1203, #1204): May be required when lines at speeds greater than 4800 bps are to be installed. Associated with the invocation by software, the Address Substitution capability allows multiple scanning of an LS's address at the expense of not scanning other LS addresses. The specify feature blocks the installation of a LS in those address positions that are not scanned by address substitution. The choice of which of the four following specify features is to be ordered should be based on the number of high-speed lines to be installed and their relative LS positions within the first LIB position. The lowest position (#1201) is always specified first, followed by each succeeding number. For those positions within a LIB where Address Substitution is invoked, only the even addresses are scanned. To allow installation of LSs in the "blocked positions", so that LSs can be used on a part time basis, do not specify the Address Substitution option.

Address Substitutions should not be specified when standard LS placement is desired on special scheduled systems which invoke address substitution SYGEN options only on a part-time basis.

- #1201 - Blocks installation of a LS in partition 8 (both 3705 and 3706s) on all Type 1 and Type 2 LIBs. Specify #1201 when the first LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.
- #1202 - Blocks installation of a LS in partition 7 (3705 and 3706s) on all Type 1 and Type 2 LIBs. Specify #1202 when the second LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.
- #1203 - Blocks installation of a LS in partition 6 (3705 and 3706s) on all Type 1, Type 2, Type 3 and Type 10 LIBs. Specify #1203 when the third LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.
- #1204 - Blocks installation of a LS in partition 5 (3705 and 3706s) on all Type 1, Type 2, Type 3 and Type 10 LIBs. Specify #1204 when the fourth LS of the first LIB is to contain the high-speed (greater than 4800 bps) line.

Maximum: One each of the above per 3705 and 3706. Limitations: The same specify feature should be ordered on all associated 3706(s) when a 3705 requires Address Substitution. Prerequisites: #1642. Field Installation: Yes.

**Note:** When Address Substitution is specified, it will block LS installation in all LIBs in the 3705 and associated 3706(s), and therefore, will reduce the physical line handling capability of the 3705. See "IBM 3704/3705 Communications Controller, Principles of Operation", GC30-3004, for further details.

Address Substitution should not be used on a 3705 containing a CS1 or CS3.

**Note:** When CS3 High-Speed (#1644) is in a 3705, the Address Substitution cannot be used by any scanner in the 3705. High-Speed Select cannot be employed with LS 1TA or 1GA.

High-Speed Select: For the 3705 with a CS3 there are two methods of address modification: Upper Scan Limits (USL) and High-Speed Select (HSS), which allow the CS3 to operate with LS speeds greater than 4800 bps. For information on USL, see the "IBM 3704 and 3705 Principles of Operation", GC30-3004.

HSS (#1211, #1212, #1213, #1214, #1215, #1216, #1217, #1218) may be required when lines at speeds greater than 4800 bps are to be installed. The specify feature blocks the installation of a LS in a position whose address is not scanned. The choice of which of the eight following specify features is to be ordered should be based on the number of high-speed lines used and their relative positions within a LIB position. For those positions within a LIB where High-Speed Select is invoked, only the even addresses are scanned.

- #1211-Blocks installation of a LS in partition 1 of the additional LIBs within a 3705 or 3706 module. Only the 3705 or 3706 module containing the high-speed line is affected.
- #1212-Blocks installation of a LS in partition 2
- #1213-Blocks installation of a LS in partition 3
- #1214-Blocks installation of a LS in partition 4
- #1215-Blocks installation of a LS in partition 5
- #1216-Blocks installation of a LS in partition 6
- #1217-Blocks installation of a LS in partition 7
- #1218-Blocks installation of a LS in partition 8

**Note:** When HSS is specified, it will restrict LS installation in all LIBs (except LIB position 1) of the 3705 or 3706 which has the scanner modification implemented. See "IBM 3704/3705 Principles of Operation", GC30-3004, for further details. Prerequisites: CS3 (#1643). Maximum: One each of the above per CS3 (#1643). Limitation: None. Field Installation: Yes.

**Note:** When CS3 High-Speed (#1644) is in a 3705, the Address Substitution cannot be used by any scanner in the 3705. HSS cannot be employed with LS 1TA or 1GA.

- Cabling: #9080 for below floor, or #9081 for on floor.
- A Communication Cable Order must be submitted for: Each new 3705 or 3706 machine order; each MES order where the added feature requires external cable.
- In Japan, #2946 must be supplied to satisfy the NTT's DTE self-test requirements when attaching a non-IBM modem with LSs 1A, 1D or 1H. Only one 2946 is required per 3705. When ordering an IBM Integrated Modem (LSs 5A, 5B, 8A, 10A, 11A, 11B, or 12A), one #2943 must be ordered for each modem.
- Prior to submitting an MES order, the Branch Manager should be consulted for any software/hardware compatibility requirements resulting from the order.
- 3705 Specification Sheet: A completed sheet (Z120-2369) may be required. See "Line Attachment Configurator" in the Special Features section.
- If a 3705 is ordered with one (or none) of the following specify codes, the same must be ordered for all 3706 expansion frames (if any) in the machine.
- The 3705 operator panel language will be determined by one of the following specify codes. If one of the following is not specified, France will receive French, Germany will receive German, and all other countries will receive English.
- The 3705 or 3706 service area warning labels will be supplied in the official language of the following countries regardless of specify code ordered. For other countries, the label language will be determined by one of the following specify codes unless one of the following is not specified, in which case the labels will be supplied in English.

The following specify codes are not field installable:

Country	Code	Label	Panel	Specify
Canada	649	English/Can. Fr.	English	#2934
France	706	French	French	#2928
Germany	724	German	German	#2929
Italy	758	Italian	English	#2932
Japan	760	Japanese	English	#2930
Spain	838	Spanish	English	#2931
UK	866	English	English	#2927

- Cables: The cables that are included in each line set are listed in the "IBM Input/Output Equipment Installation Manual - Physical Planning", GC22-7064. These cables must be ordered separately from the 3705 order on a cable order.

To obtain cables longer than 15 meters (50 feet), select the required cable below and order the cable assembly P/N and the required cable length in meters. These(Except Canada > longer cables are ordered by P/N on an MES.<) (Canada

only> Longer cables are ordered by P/N on cable order Form 2642. <) The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the(Except Canada> QSLM file<) (Canada only> FED parts price list<) for prices.

To order a cable for a CCITT V.35 Interface Modem Attachment:

Duplex (Line Set Type 1U #4726)  
Order cable assembly P/N 1648394  
(See Note 1)

Half-Duplex (Line Set 1K #2944)  
Order cable assembly P/N 5997479 (See Note 1)

To order a cable for a Autocall Originate (RS-366-A/CCITT V.25) Interface Attachment:

(Line Set Type 1E #4715)  
Order cable assembly P/N 1753439 (See Note 2)

Note 1: Maximum Length: 30 meters (100 feet)

Note 2: Maximum Length: 45 meters (150 feet)

To order a cable for a EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The 3705 can now support a cable length of up to 100 meters when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 15 meters (50 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications.

To connect a cable longer than 15 meters (50 feet) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier:

A 3863 or 3864 or 3865 modem which does not have Data Multiplexer #3260 installed must have EC 344120 installed.

A 3865 modem with Data Multiplexer #3260 installed must have EC 323406 installed.

3. Order a Duplex or Half-Duplex Cable:

Duplex (Line Set 1D or 1H #4714 or #4718, order cable assembly P/N 1785928. (See Note 1.)

Half-Duplex (Line Set 1D #4714, order cable assembly P/N 1785929. (See Note 1.)

Note: Maximum length 100 meters (328 feet).

### SPECIAL FEATURES

#### Non-Communications Features

**Remote Power - Off (#6250):** Provides the capability of turning the 3705-II power off with a command over a communication line. This feature is applicable to the 3705-II when the 3705-II is utilized only as a remote stand-alone. Maximum: One per 3705-II. Field Installation: Yes. Prerequisites: #6261.

**Remote Program Loader-II (#6261):** Provides the means of remotely loading the NCP with or without a CA on the machine. Maximum: One per 3705-II. Limitations: For the 3705-II, cannot be installed with four CA4s (#1544), but any other proper CA combination (see CA section) is acceptable; also, the RPL-II feature on the 3705-II cannot be installed with #4705 or #5001 unless there is a CA also installed. Field Installation: Yes.

**Two-Channel Switch (#8002):** To attach either #1541, #1542 or #1544 to two defined host Processor channels, which may be on the same CPU or on two different CPUs. The CA so equipped will, however, be enabled for operation on one channel at a time. Selection of which channel is to be operable is by a manual switch on the control panel. Maximum: One per CA. Limitations: If two CAs are in the same frame, then no #8002 is allowed; otherwise, one #8002 per CA. Field Installation: Yes. Prerequisites: #1541 or #1542 or #1544.

**Unit Protection (#8510):** Provides a lock on the 3705 that deactivates all push buttons, mode select switches, and diagnostic rotary switches on the control panel when the key is removed from the lock, channel enable/disable, function select rotary switches and power on/off are unaffected. This is included on all models. For additional or replacement keys, see "Accessories". Maximum: One per 3705. Limitations: None. Field Installation: Yes. Prerequisites: None.

### Communications Features

**Attachment Base Type 1 (#1301):** Provides interface logic for CA1 and/or the CS1. Limitations: #1301 is needed on the 3705-II only when used in conjunction with #1541. No more than one #1301 or #1302 per 3705. Field Installation: Yes.

**Attachment Base Type 2 (#1302):** Provides interface logic for CS2, CS3, and CS3HS. Limitations: #1302 is required for CS2, CS3 or CS3HS. No more than one #1301 or #1302 per 3705. Field Installation: Yes. Note: CA2, CA3, and CA4 contain the AB logic within the logic of their respective features.

**Channel Adapter Type 1 (#1541):** For communication with the defined host processor Byte Multiplexer Channel. All such communications are accomplished via 1, 2, 3 or 4-byte transfers, with de-selection and re-selection between each transfer. Data transfer rates are primarily dependent upon the 3705's internal processing requirements. Maximum, Limitations, Prerequisites: See above general description. Field Installation: Yes.

**Channel Adapter Type 2 (#1542):** A high-performance adapter for NCP mode only, which supports communication with a defined host processor's Byte Multiplexer, Block Multiplexer, or Selector Channel, at data transfer rates of up to 276 KB bytes/second (limited by system channel capability). Transfer is always accomplished in "burst" mode, with a 2-byte "burst" standard on the Byte Multiplexer Channel, full "burst" standard on the Block Multiplexer and Selector Channels. Maximum, Limitations, Prerequisites: See general description under "Highlights". Field Installation: Yes.

**Channel Adapter Type 3 (#1543):** An adapter of the same performance characteristics as the Type 2 (#1542) with the additional capability of an automatic two-processor switch. It communicates with a defined host processor's Byte Multiplexer, Block Multiplexer, or Selector Channel (mdls 115 and 125 excepted). The switch, part of the basic adapter, is primarily designed to furnish symmetric support for two tightly-coupled processors; i.e., each side of the switch is connected to one of the two MP CPUs. Additionally, this Adapter can be attached to two channels from one CPU to provide alternate path capability. For either tightly-coupled multiprocessor or single CPU attachments, data transfer occurs on only one path at a time. Included as standard is a remote switch attachment capability to remotely control the switch from the configuration control panel of a S/370 Mdl 158 MP or 168 MP, as well as from the 2925 mdl 10 Remote Switching Console. Maximum, Limitations, Prerequisites: See general description under "Highlights". Field Installation: Yes.

**Channel Adapter Type 4 (#1544):** Provides attachment to defined host processor's Byte Multiplexer, Block Multiplexer or Selector Channel. It supports either a high-performance Emulation Program running with a CS3HS, a CS2 or CS3 or a high-performance Network Control Program running the same scanners. When attached to a byte multiplexer channel, the CA4 transfers bytes in "bursts" of up to 32 bytes prior to interrupting the control program when running in EP mode. In ACF/NCP/VS mode, the CA4 transfers in "bursts" up to 16 bytes and can transfer up to 248 bytes prior to interrupting the control program. In ACF/NCP/VS mode, when attached to a defined host processor's Block Multiplexer or Selector Channel, the CA4 "bursts" up to 248 bytes and can transfer up to 248 bytes prior to in-

interrupting the control program. When the CA4 is supported using the ACF/NCP/VS Program Product, the CA operates in a cycle steal mode (data is directly moved to or from storage, and after this is accomplished, the control program resumes its operation at the completion of this stolen cycle unless another "cycle steal" request is pending). The cycle steal operation improves the 3705 throughput when compared with NCP/VS support of CA4 by reducing the number and complexity of control program interrupts. When attached to a byte multiplexer channel and supported by NCP/VS, the CA4 transfers in bursts of 4 bytes per control program interrupt. This CA is necessary when using the CS3 in Emulation Mode. Maximum, Limitations, Prerequisites: See general description under "Highlights". Field Installation: Yes.

**Communication Scanner Type 2 (#1642):** Provides a medium performance operation. The Scanner provides for the transfer of data between storage and the LSs on a byte-by-byte basis. The Scanner assembles and disassembles characters. The Scanner interrupts the control program on a byte-by-byte basis. The control program provides for the line control, control character recognition, code translation and error recovery functions. Maximum: One Scanner per frame. Limitations, Prerequisites: See "Highlights". Field Installation: Yes.

**Communication Scanner Type 3 (#1643):** Provides a high performance operation. This Scanner provides for data transfer between storage and the LSs on a multi-byte (buffer) basis. Data transfer between storage and the CS3 is accomplished on a storage cycle steal basis (the CS3 interrupts execution of the control program for a machine cycle, moves data to or from storage. At the conclusion of the data movement, the control program resumes its operation at the point of the interrupt, unless another "cycle steal" request is pending.) This feature supports only synchronous lines and provides control character recognition for BSC and SDLC line controls. This feature provides ASCII to EBCDIC and EBCDIC to ASCII code translation when operating with BSC line control, in NCP mode only. The CS3 interrupts the control program either on (up to 254 character) buffer boundaries, or by unique control characters, or at certain error conditions. Maximum: One Scanner per Frame. Limitations: If a CS3 on a 3705 mdl L is in the last frame, order RPQ S30274 (no-charge) for all the frames. Prerequisites: See "Highlights". Field Installation: Yes.

**Communication Scanner Type 3 High-Speed (#1644):** Is a modified #1643 which allows line speeds up to 230.4K bps. Only two half-duplex data or one full-duplex data line can be attached to this scanner. Maximum: One Scanner per frame. Limitations and Prerequisites: See general description under "Highlights". Field Installation: Yes.

**Line Set Type 1K (#2944):** (External CCITT V.35 Modem) Provides for the attachment of one synchronous communication line for operation at 48K bps, 40.8K bps, 56K bps, or 57.6K bps, via an external modem having an interface that conforms to the requirements of CCITT V.35. The 1K LS may be operated at 14.4K bps or 57.6K bps in conjunction with a #4727 in another 3705. See Scan Limits, Address Substitution and HSS under "Specify". Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Business Machine Clock #4651:** When either #4727 or #4728 is located in a #4701, then a BMC #4651 must be added to the LIB. Maximum: One per 3705/ or 3706 module. Limitations: Must be applied to LIB 1 in position one of a 3705 or 3706 module. Prerequisites: #4727 or #4728 in LIB position one. Specify: #9621 for 14.4K bps --- #9622 for 57.6K bps.

**Line Interface Base Type 1 (#4701):** Provides for attaching LSs which interface to external modems or locally (directly) attached terminals. Maximum, Limitations, Prerequisites: See Figure 1. Field Installation: Yes.

**Line Interface Base Type 2 (#4702):** Provides for attaching LSs which interface to telegraph circuits. Maximum, Limitations, Prerequisites: See Figure 1. Field Installation: Yes.

**Line Interface Base Type 3 (#4703):** Provides for attaching IBM Limited Distance Line Adapters. Maximum, Limitations, Prerequisites: See Figure 1. Field Installation: Yes.

**Line Interface Base Type 8 #4708:** Provides for attaching 1200 bps Integrated Modems. Maximum, Limitations, Prerequisites: See Figure 1. Field Installation: Yes.

**Line Set 1D (#4714):** (up to 9600 bps Attachment) Provides for the attachment of external modems or Direct Attachment of terminals. One of the following cable groups must also be ordered.

1. Modem Attach Half-Duplex, cable group #485: Two communication lines (up to 19.2K bps over nonswitched or switched facilities and 9.6K bps over switched facilities in synchronous mode). This cable group is mandatory for 2-wire SNBU with a 5865 or 5866 equipped with #7952.
2. Modem Attach Duplex, cable group #473 for Synchronous Attachment, or cable group #492 for Asynchronous Attachment: One communication line up to 19200 bps over nonswitched, 4-wire, facilities, transmitting duplex data, using external modems with EIA RS-232-C/CCITT V.24 interfaces. This mode of operation provides for the transmission of data simultaneously in a transmit and receive mode. This function is to be used in place of #4718 or #4712.
3. Direct Attach Synchronous, cable group #1358, up to 100 feet: For direct attachment of two half-duplex IBM Terminals up to 2400 bps with IBM-provided cables. Modems are not required. This LS requires different cable groups depending upon terminal type. For cabling information see "IBM System/370 Installation Manual - Physical Planning", GC22-7064. The attached terminals must be equipped with a BMC and must provide a standard external cable to which this cable will attach. This function is to be used in place of #4716.

Note 1: When operating this LS over 4800 bps, refer to Address Substitution and HSS under "Specify".

Note 2: For Asynchronous Direct Attach Operation, order RPQ 8Q0261.

**Line Set Type 1E (#4715):** (Autocall Unit) Provides two RS-366 interfaces for attachment of external automatic calling units. Maximum, Limitations and Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 1G (#4717):** (High-Speed External Modem) For attachment of one synchronous communication line for operation at 19.2K bps, or 50K bps. Has a digital interface for attachment to a switched or leased wideband external modem. Note: Total wire length may not exceed 4.75 wire-miles. See GA24-3435 for further details. See Scan Limits, Address Substitution and High-Speed Select under "Specify". Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 2A (#4721):** (Telegraph Single Current) For attachment of two single current telegraph lines, each of which may be wired for 20 mA, 40 mA, or 62.5 mA single current termination. Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 1GA (#4722):** (High-Speed External Modem) For attachment of one synchronous, half-duplex data communication line for operation up to 230.4K bps; has a digital interface for attachment to a leased wideband external modem. Maximum: Two per #4701. Limitations: Up to two LSs of this type allowed in the same 3705/3706 frame. Field Installation: Yes. Prerequisites: #1644.

**Line Set Type 1TA (#4723):** (High-Speed External Modem) For attachment of one synchronous, full duplex data communication line for operation up to 230.4K bps. Has a digital interface for attachment to a leased wideband external modem. Maximum: One per #4701. Limitations: Only one LS per 3705 or 3706 frame. Field Installation: Yes. Prerequisites: #1644.

**Line Set Type 1T (#4725):** (High-Speed Duplex External Modem) 20.4K bps, and 40.8K bps. This LS will only run with the NCP program product. Provides for the attachment of one duplex synchronous line which has a digital interface for attachment to an external data set for 20.4K bps, and 40.8K bps

leased wideband facilities. The control program must condition this line interface for external clock control. See Scan Limits, Address Substitution and HSS under "Specify". Maximum, Prerequisites, and Limitations: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 1U (#4726):** (High-Speed Duplex External Modem) 48K bps. This LS will only run with the NCP program product. Provides for the attachment of one duplex synchronous line which has a CCITT V.35 interface for attachment to an external data set for up to 48K bps communication facilities. The control program must condition this line interface for external clock control. The 1U LS may be operated at 14.4K bps or 57.6K bps in conjunction with a #4728 in another 3705. See Scan Limits, Address Substitution and HSS under "Specify". Maximum, Prerequisites and Limitations: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 1W (#4727):** (High-Speed Local Attach) 14.4K bps or 57.6K bps, half-duplex data. Provides for local attachment of a single half-duplex synchronous device which has a CCITT V.35 type interface (similar to the LS Type 1K.) Clocking is provided for this LS by #4651; the attached device must be set for external clock control. The total cable length must not exceed 60 meters (200 feet) at 14.4K bps operation, and 30 meters (100 feet) at 57.6K bps operation. The total length includes the attached device cable length. See Scan Limits, Address Substitution, and HSS under "Specify". Maximum: Eight per LIB Type 1. Limitations and Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 1Z (#4728):** (High-Speed Local Attach Duplex) 57.6K bps duplex data. Provides for the local attachment of a single duplex synchronous device which has a CCITT V.35 interface (similar to LS1U). Clocking is provided for this LS by #4651, such that the attached device must be set for external clock control. The total cable length must not exceed 60 meters (200 feet) at 14.4K bps operation, and 30 meters (100 feet) at 57.6K bps operation. The total length includes the attached device cable length. See Scan Limits, Address Substitution, and HSS under "Specify". Maximum: Four per LIB Type 1. Limitations and Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 3A (#4731):** (Limited Distance Type 1 Line Adapter, 2-wire) For attachment of two half-duplex, start/stop lines at speeds up to 134.5 bps. Includes two IBM Limited Distance Type 1 (2-wire) Line Adapters and no external modems are required. Note: Total wire length may not exceed 4.75 wire-miles. See GA24-3435 for further details. Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 3B (#4732):** (Limited Distance Type 1 Line Adapter, 4-wire) For attachment of two start/stop lines at speeds up to 134.5 bps. Includes two IBM Limited Distance Type 1 (4-wire) Line Adapters; no external modems are required. Note: Total wire length may not exceed 4.75 wire-miles. See GA24-3435 for further details. Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 8A (#4781):** (1200 bps Leased Line Adapter) Provides for the attachment of two start/stop or synchronous lines at speeds up to 600 bps or at 1200 bps. This LS includes two 1200 bps LAs suitable for communication over a leased voice grade channel with similar LAs. No external Modems are required. Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Set Type 10A (#4784):** (1200 bps Leased Duplex Data Integrated Modem) Provides for the attachment of one synchronous line capable of duplex data transmission at speeds up to 1200 bps. This LS includes one 1200 bps integrated modem. No external modem is required. Maximum, Limitations, Prerequisites: See Figures 1 and 3. Field Installation: Yes.

**Line Interface Base Type 10 (#5000):** Provides for attaching 1200 bps Integrated Modems with duplex data transmission capability. Maximum, Limitations, Prerequisites: See Figure 1. Field Installation: Yes.

**Line Set Type 1N (#5655):** (Nonswitched CCITT X.21 Interface) Provides for the attachment of two half-duplex data nonswitched synchronous lines, or one duplex data nonswitched synchronous

line at speeds of 2400 or 4800 or 9600 or 48K bps, via a DCE complying with CCITT Recommendation X.21. Operation is allowed with either a #1642 or a #1643. Specify #9842 for medium speed applications (2400 or 4800 or 9600 bps). Specify #9843 for high-speed applications (48K bps). Order cable group #1391 for duplex, or order cable group #1392 for half-duplex (one for each LS) and order cable group #1396 (required only one per 3705 or 3706) (Maintenance "Y" Cable). Limitations and Maximum: See Figures 1 and 3. Field Installation: Yes. Prerequisites: #4701 --- #4650 at 2400 bps (specify #9610). (This is in addition to the BMC required for all externally clocked LSs.)

**Line Set Type 1R (#5656):** (Switched CCITT X.21 Interface) Provides for the attachment of one duplex data switched synchronous line at speeds of 2400, or 4800, or 9600 or 48K bps, via a DCE complying with CCITT Recommendation X.21. Operation is allowed only on a CS2 (#1642). Specify #9840 for medium-speed application (2400, 4800, or 9600 bps). Specify #9841 for high-speed application (48K bps). Order cable group #1391 for each LS. Limitations: May be installed only on a 3705-II and CS2. See Figures 1 and 3. Maximum: See Figures 1 and 3. Field Installation: Yes. Prerequisites: #4701 --- BMC at 2400 bps; (#4650, specify #9610) --- BMC (#4650) at 1/24 or less of the operating speed of the attached Data Communication Equipment; for 2400 bps specify #2716, or #9604, or #2715; for 4800 bps, specify #2717, or #9606, or #2716, or #9604, or #2715; for 9600 bps, specify #9612, or #2717, or #9606, or #2716, or #9604, or #2715; for 48K bps, specify #9609, or #9608, or #9607, or #9612, or #2717, or #9606, or #2716, or #9604, or #2715.

**Business Machine Clock (#4650):** Within each communication channel there must be a clocking mechanism to time the data rate. When this clocking mechanism is not provided by either the communication facility or the modem, then the 3705 must provide the clocking through the use of a BMC. The clock speed should match the data rate in bits per second (bps). The BMCs are contained within the CS. A clock in a CS cannot be used by communication lines attached to a different CS. Each CS1 or CS2 must have at least one BMC, with each scanner limited to a maximum of four clocks. If a CS has at least one communication line attached where either the modem or the communication facility provides the clocking, then one of the possible four clocks in the scanner must be less than one-half the speed of the lowest speed of the externally clocked line attachment. The 1N and 1R LSs each have unique internal clock requirements. See detail descriptions of these LSs for further information. All local attached terminals must have a BMC in the 3705 which matches the transmission rate (bps) of the terminal. Note: The BMC is assigned to a given communication line interface under the control of the program operating in the 3705. Note: CS3 must have BMC --- Specify #9615 and may have one other clock (either specify #9609 or #9610). The following LSs must have a BMC:

Line Set 1A #4711  
Line Set 1B #4712  
Line Set 1C #4713  
Line Set 1D #4714 when used for direct attach, or start/stop.  
Line Set 1F #4716  
Line Set 1N #5655  
Line Set 1R #5656  
Line Set 2A #4721  
Line Set 3A #4731  
Line Set 3B #4732  
Line Set 4A #4741  
Line Set 4B #4742  
Line Set 4C #4743  
Line Set 8A #4781  
Line Set 10A #4784

The following LSs may require a BMC, if the clocking is not supplied by the modem:

Line Set 1D #4714  
Line Set 1H #4718

A BMC is required for each speed; specify one of the following speeds for each BMC:

Speed	Specify
50.0	#2715 - for WT Teleprinters
75.0	#9604 - for WT Teleprinters

## MACHINES

100.0 #2716 - for WT Teleprinters  
134.5 #9606  
200.0 #2717  
300.0 #9612  
600.0 #9607  
1200.0 #9608  
2000.0 #9609  
2400.0 #9610  
150,600,1200 #9615\*

\* Note: #9615 is only available with #1643 and #1644, and is mandatory.

Maximum: Four with CS type 1 or Type 2. Two with CS3. Field Installation: Yes. The above requirements for a BMC can only be satisfied by #4650. These requirements are not satisfied by #4651.

## MODEL CONVERSIONS

For an installed or on-order 3705, any required 3706(s) must be ordered on AAS. Any model change on an installed 3705, whether or not an additional 3706 is needed, must have an MES(s) entered for the model conversion on both the 3705 and any installed 3706(s). "Specify" items for voltage, color, and cabling must be included on new 3706 order(s). Also see Specify items for Address Substitution and for Communication Cable Order.

- The change from Models A, B, C, or D to models J, K, or L must be done in two stages. Order the first MES to go from A, B, C, or D to E, F, G, or H and the second MES to go from models E, F, G, or H to Models J, K, or L.
- The model designations for the 3705 and all associated frames (3706s) must be changed whenever memory is added or deleted, and whenever a frame (3706) is added or deleted.

3705 models J, K, or L are not recommended for field downgrade to 3705 models A, B, C, D, E, F, G, H and 3705 models E, F, G, or H are not recommended for field downgrade to 3705 models A, B, C or D.

## ACCESSORIES

**Keys:** A 3705-II with Unit Protection (#8510) is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

## SUPPLIES (NONE)

## 3705 COMMUNICATIONS CONTROLLER MODEL 80

### PURPOSE

The 3705-80 will attach to S/370, 303X, 4300, or 9370 Processors for communication with local or remote I/O devices over various communication facilities. The 3705-80 will also attach to S/360 models 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only.

The 3705-80 is one of a series of Communications Controllers. The following is a brief summary of the Communications Controllers.

Comm Cntrl	Max* Line	Max Stor	Host Program	Comm Cntrl Program
3705-80	16 16	256K 256K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3704	32	64K	BTAM	EP
3705-II	255 352	512K 512K	BTAM VTAM/TCAM	EP ACF/NCP-PEP
3725-1	256	1024K	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	24	512K	VTAM/TCAM BTAM	ACF/NCP-PEP EP

\* Maximum lines that can physically attach, CF3705 is required to predict actual line attachment capabilities.

See individual pages for each Communications Controller for information on additional features.

### MODEL 80

The 3705-80 is available in sub-models to allow easy selection of a communications controller by line attachment capability. These models are:

**M81:** (NO LONGER AVAILABLE) 4 Line Attachments of EIA RS-232-C/CCITT V.24

**M82:** (NO LONGER AVAILABLE) 10 Line Attachments of EIA RS-232-C/CCITT V.24

**M83:** (NO LONGER AVAILABLE) 16 Line Attachments of EIA RS-232-C/CCITT V.24

**M84:** 10 Line Attachments of:

- 4 EIA RS-232-C/CCITT V.24
- 6 CCITT X.21

### HIGHLIGHTS

The 3705 Communications Controller mdl 80 is designed for a user starting in communications. The 3705-80:

- Contains all the required features and functions to run duplex or half-duplex data transmission communication lines to an EIA or CCITT interface in the multiplexer; a channel adapter or RPL must be selected. Cables must be ordered separately.
- 256K bytes of storage are standard on all models.
- Uses ACF/NCP/VS R2.1, ACF/NCP/VS R3, NCP/VS for OS/VS with one channel adapter, or EP 3.0.

- Has a common line set for SDLC, BSC and Start/Stop protocols at line speeds up to 9600 bps for Start/Stop and 19.2K bps for SDLC and BSC.
- Provides a basic Business Machine Clock (BMC) of 134.5 bps in all models.
- The operator's Panel Key Lock is standard on all models.
- Publications: See related publications in the "Introduction to the IBM 3705-80 Communications Controller", GA27-3304, available from Mechanicsburg.
- Provides for attachment of a duplex or half-duplex line (CCITT V.35) up to 56K bps, or
- Provides a digital interface for attachment of a duplex or half-duplex line up to 50K bps, or
- Allows for attachment of up to two switched or nonswitched CCITT X.21 lines up to 9600 bps, or
- Allows for attachment of a CCITT X.21 high-speed line up to 48K bps Auto Call Units, or
- Allows for high-speed local attachment of devices at 14.4K bps, or 57.6K bps.
- Allows for the attachment of Channel Adapter 1 (byte mode of operation).
- Allows for the attachment of one or two Channel Adapters Type 4 (cycle steal mode or byte mode of operation).
- Allows for the connection of any one of two host channels with the two-channel switch (manual operation).
- Allows for remote operation with the Remote Program Loader with or without a channel adapter.

**Machine Organization:** The 3705-80 provides all functions necessary to run duplex or half-duplex EIA or CCITT lines up to 9600 bps with EP, NCP or PEP; a channel adapter or RPL must be selected. Cables must be ordered separately. Major components of the 3705-80 are:

- Communications Scanner Type 2 (CS2) modified is standard in all models and provides for connection between the line and the Central Control Unit (CCU). The modified CS2 scans the line addresses and places the information into the CCU storage.
- 256K bytes of storage are standard in all models.
- Channel Adapter 1 (CA1) provides the interface between the 3705-80 and a S/370, 30XX or 4300 Processor. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only. The CA1 communicates with the processor byte multiplexer channel. The CA1 is an optional feature. Only one can be installed per machine.
- Channel Adapter 4 (CA4) provides the interface between the 3705-80 and a S/370, 30XX, 4300, or 9370 Processor. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only. The CA4 can connect to the byte multiplexer channel (like the CA1), the block, or selector channels.
- Line sets and line attachments provide the electronics to interface to a communications facility.
- BMC provides the clocking of data in and out of the communications scanner. A BMC of 134.5 bps is included in all models. A total of four clocks can be included.
- Remote Program Loader (RPL) feature provides the means of loading the NCP into the 3705-80 without using the channel adapter. This is an optional feature.

- The Operator Panel Lock (Unit Protection) provides a keylock that deactivates all push buttons, mode select switches and diagnostic rotary switches on the control panel when the key is removed from the lock. Channel enable/disable, function select rotary switches and power on/off are unaffected. This is included on all models. For additional or replacement keys, see "Accessories".
- High-speed line attachment (19.2K bps to 57.6K bps using the CCITT V.35 or digital interface). One high-speed duplex line, or two half-duplex high-speed lines can be attached to the 3705-80. Address Substitution is used in the 3705 program for the Communications Scanner Type 2 (modified) to scan the high-speed even line addresses at a greater frequency.
- Upper Scan Limit of 16 must be used when the EIA RS-232-C/CCITT V.24 is operated at 19.2K bps to scan even and odd line addresses.

**Communications Facilities:** The 3705-80 operates over PTT-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

**Modems:** The following modems are used with the 3705-80. These modems take advantage of the diagnostic capabilities which are contained in the Network Problem Determination Application (NPDA) Release 2 (PP 5735-XX8). The modems are:

Modem (models)	Speed (bps)	Lines
3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1/2	2400/1200	Nonswitched or switched voice grade
3864-1/2	4800/2400	Nonswitched or switched voice grade
3865-1/2	9600/4800	Nonswitched voice grade
3868-1	2400/1200	Nonswitched voice grade
3868-2	4800/2400	Nonswitched voice grade
3868-3/4	9600/4800	Nonswitched voice grade

Modem NPDA Version 3 Release 2

Modem (models)	Speed (bps)	Lines
5865-001	9600	Nonswitched voice grade
5866-001	14400/9600	Nonswitched voice grade
5868-051		Rack mount version of 5865-001
5868-061		Rack mount version of 5866-001

The above modems are supported in ACF/NCP Version 3. The following modems are supported in ACF/NCP Version 4 (LPDA-1 only).

Modem (models)	Speed (bps)	Lines
5865-002,003	9600	Nonswitched

5866-002,003 14400/9600 voice grade  
5868-052 Nonswitched voice grade  
5868-062 Rack mount version of 5865-002  
Rack mount version of 5866-002  
The following modems are supported in ACF/NCP Version 4 Release 2 (LPDA-1 for 5812s and LPDA-2 for 586Xs)

Modem (models)	Speed (bps)	Lines
5812-10	From 2400 up to 19200	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-002,003	9600	Nonswitched voice grade
5866-002,003	14400/9600	Nonswitched voice grade
5868-052		Rack mount version of 5865-002
5868-062		Rack mount version of 5866-002

Other modems are (not LPDA):

Modem (models)	Speed (bps)	Lines
3872-1	2400/1200	Nonswitched or switched voice grade*
3976-1	200	Nonswitched voice grade
3976-2	300	Switched
3976-3	1200/600	Nonswitched or switched voice grade
5811-10	2400/4800/9600/19200 from 2400 up to 19200 (Sync.)	Nonswitched baseband
5811-20	Up to 9600 (Async.)	Nonswitched baseband
5811-18		Rack mount version of 5811-10
5811-28		Rack mount version of 5811-20
5812-10(*)	Up to 9600 (Async.)	Nonswitched baseband
5812-18(*)		Rack mount version of 5812-18
5811-28		Rack mount version of 5811-20
5821-10	2400/4800/9600/19200	Nonswitched baseband

\* The 5812 modems do not support LPDA in Asynchronous Mode.

4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU available on 5865 and 5866 modems with feature #7952 requires half-duplex line operation. See your TCM branch/TP coordinator for country limitations.

RPQ Modems may be attached (refer to M2700 pages for details).

PTT Mandatory Modems meeting CCITT Recommendations V.24, V.28 and ISO Standard 2110 and relevant CCITT recommendations for data transmission speed may connect to the CCITT V.24 Line Attachment.

PTT Mandatory Modems meeting CCITT Recommendation V.35 and ISO Standard 2593 may be attached to Line Set 2 (#6712).

PTT Mandatory Auto Call Units meeting CCITT Recommendation V.25 and ISO Standard 2110 may be attached to Line Set 4 (#6714).

See M2700 pages for details.

Non-IBM Modems may be attached subject to the Multiple Supplier Systems Bulletin.

**World Trade Data Networks:** Attachment to World Trade Data Networks is supported as follows:

- CCITT V.24 Line Attachment connects to CCITT X.21bis switched and nonswitched networks in Japan.
- Line Set 2 connects to CCITT X.21bis nonswitched in Japan.
- Line Sets 8 & 9 connect to CCITT X.21 switched and non-switched networks in Japan.

### EIA RS-232-C/CCITT V.24 Line Attachments

Mdl M81 supports 4 Line Attachments

Mdl M82 supports 10 Line Attachments

Mdl M83 supports 16 Line Attachments

Mdl M84 Supports 10 Line Attachments of:

- 4 - EIA RS-232-C/CCITT V.24 and
- 6 - CCITT X.21 (see Line Set 8 #5657)

The RS-232-C/CCITT V.24 line attachments support lines up to and including 9600 bps using S/S, BSC, or SDLC line protocols. These lines can be duplex or half-duplex using the RS-232-C/CCITT V.24 interface. Half-duplex data transmission requires one address in EP, or NCP; synchronous duplex data transmission requires two addresses in the NCP. For duplex operation (4-wire) specify #9711; for half-duplex operation (2- or 4-wire) specify #9712. Synchronous lines can operate at 19.2K bps using upper scan limit of 16. An upper scan limit of 16 will only scan Line Interface Addresses 20 through 2F. Other Line Interface Addresses will not be scanned.

Each specify code #9711 will cause two line attachments to be installed as duplex and each specify code #9712 will cause two Line Attachments to be installed as half-duplex on the initial installation of the 3705-80 to the limit of the model ordered. If fewer lines are specified than the model allows, the remaining lines will be installed as half-duplex.

To change between Duplex and Half-Duplex mode of operation, order a Record Purpose-Only MES:

- Specify #9720 to change one or more line attachments from duplex to half-duplex.
- Specify #9721 to change one or more line attachments from half-duplex to duplex.

The CE must be provided the MES number from the Record Purpose-Only MES, the Specify Code(s), the Line Interface Address(es) to be changed with each associated Specify Code and reference the VA000A installation instructions. Specify Codes #9712 and #9711 are not recommended for field installation.

Any line attachment can connect to an external modem or directly to a device with one of the following cables. Each line attachment requires one cable.

- Attachment to one external modem requires Cable Group #1404 for each modem.
- Direct attachment (HDX) of a device requires Cable Group: #1399 for S/S, or #1400 for Synchronous (SDLC & BSC) for each device. Check clocking requirements and device requirements for each direct attachment.

For 2740 with Station Control and all other Start/Stop Directly Attached devices CE must install jumpers on the machine as defined in the installation instructions. To change the line attachment to or from Directly Attached Start/Stop operation, order a Record Purpose-Only MES using the appropriate Specify Code for one or more line attachments as follows:

#9722	modem attach or sync attach	to	any S/S direct attach
#9722	2740 w/o station control direct attach	to	any other S/S direct attach
#9722	any other S/S direct attach	to	2740 w/o station control direct attach
#9723	any S/S direct attach	to	modem attach or sync direct attach

The CE must be provided the MES number from the Record Purpose-Only MES, the Specify Code(s), the Line Interface Address(es) to be changed with each associated Specify Code and reference the VA000A Installation Instructions.

**Line Attachments and Line Sets:** The line sets (LS) and line attachments provide the electronics to meet the requirements of specific communications facilities. The following chart indicates by model, the Line placement and mode of operation by Line Interface Address.

Model	Line Type	Mode	Line Interface A Address							
			2	2	2	2	2	2	2	2
			0	1	2	3	4	5	6	7
M81, M82, M84	Line Attach									
EIA: RS-232-C/	DX		-	-	-	-	T	R	T	R
CCITT V.24	HDX		-	-	-	-	X	.	X	.
M81, M82, M84	Line Set 2	DX	T	.	R	.	-	-	-	-
CCITT V.35	HDX		X	.	X	.	-	-	-	-
M81, M82, M84	Line Set 3									
High Speed	DX		T	.	R	.	-	-	-	-
Digital	HDX		X	.	X	.	-	-	-	-
M81, M82, M84	Line Set 4									
Autocall			A	A	A	A	-	-	-	-
M81, M82, M84	Line Set 5									
Dir Attach	HDX		X	.	X	.	-	-	-	-
M81, M82, M84	Line Set 8									

CCITT X.21 Med Speed	DX HDX	T R T R - - - - X . X . - - - -
M81, M82, M84 Line Set 9 CCITT X.21 48K	DX HDX	T . R . - - - - X . . . - - - -
M83 Line Attach EIA: RS-232-C/ CCITT V.24	DX HDX	T R T R T R T R X . X . X . X .
Model Line Type	Mode	Line Interface Address 2 2 2 2 2 2 2 8 9 A B C D E F
M81, M82, M84 Line Attach EIA: RS-232-C/ CCITT V.24	DX HDX	T R T R b b b b X . X . b b b b
M81, M82, M84 Line Set 2 CCITT V.35	DX HDX	- - - - B B B B - - - - B B B B
M81, M82, M84 Line Set 3 High Speed Digital	DX HDX	- - - - B B B B - - - - B B B B
M81, M82, M84 Line Set 4 Autocall		- - - - - - - -
M81, M82, M84 Line Set 5 Dir Attach	HDX	- - - - B B B B
M81, M82, M84 Line Set 8 CCITT X.21 Med Speed	DX HDX	- - - - b b b b - - - - b b b b
M81, M82, M84 Line Set 9 CCITT X.21 48K	DX HDX	- - - - B B B B - - - - B B B B
M83 Line Attach EIA: RS-232-C/ CCITT V.24	DX HDX	T R T R T R T R X . X . X . X .
Model Line Type	Mode	Line Interface Address 3 3 3 3 3 3 3 0 1 2 3 4 5 6 7
M82 EIA: RS-232-C/ CCITT V.24	DX HDX	T R T R T R T R X . X . X . X .
M83 Line Attach EIA: RS-232-C/ CCITT V.24	DX HDX	T R T R T R T R X . X . X . X .
M84 Line Set 8 CCITT X.21 Med Speed	DX HDX	T R T R T R T R X . X . X . X .

Model Line Type	Mode	3 3 3 3 3 3 3 8 9 A B C D E F
M82 Line Attach EIA: RS-232-C CCITT V.24	DX HDX	T R T R b b b b X . X . b b b b
M83 Line Attach EIA: RS-232-C/ CCITT V.24	DX HDX	T R T R T R T R X . X . X . X .
M84 Line Set 8 CCITT X.21 Med Speed	DX HDX	T R T R b b b b X . X . b b b b

## Legend:

A: Denotes address used for an autocall interface.  
X: Denotes a Transmit/Receive address for a half-duplex line.  
.: Denotes an address not used and unavailable.  
-: Denotes an address not used and available.  
B: Denotes an address blocked by address substitution.  
b: Denotes an address not used and available that will be blocked if address substitution used.  
TR: Is a Transmit Receive address used on a duplex line and uses two adjacent addresses.  
T.R.: Is a Transmit Receive address used on a duplex line and uses two adjacent even addresses.

To change the mode of operation of an RS-232-C/CCITT V.24 Line Attachment, a CCITT X.21 Line Attachment, or the speed of the High-Speed Direct Attachment, use a Record Purpose-Only MES for leased machines using the Specify Codes as defined in the write-ups for each of these functions. Purchased machines submit RPQs.

These mode change Specify Codes #9720, #9721, #9722, #9723, #9724 and #9725 can be ordered only on a Record Purpose-Only MES.

**Note:** Any change for an optional CCITT V.35 (Line Set 2) or digital (Line Set 3) line attachment must be ordered by MES from the factory. A Record Purpose-Only MES cannot be used.

**Direct Attachment:** Devices to be connected directly to the 3705-80, without modems, can do so using the EIA RS-232-C/CCITT V.24 line attachment. This line attachment will attach Start/Stop, BSC or SDLC protocols up to 2400 bps. All directly attached devices (at speeds of 2400 bps or less) must have a BMC and the 3705-80 must have a BMC of equal speed.

To attach a device directly to the 3705-80 requires the direct attachment cable group defined under "Line Attachments" and a BMC. The BMC in the 3705-80 must match the speed of the clock in the attached device.

Most devices that attach directly require a feature to be installed in the device. Consult the machines pages of the device for details of the features required.

High-speed Direct Attachment, Line Set 5 (#6715), allows connection of devices to the 3705-80 without modems at speeds of 14.4K bps or 57.6K bps. This LS includes a clock, which is looped out to the device and back to the 3705-80. Therefore, the device does not need a clock.

Submit an RPQ for direct attachment of terminals at 3600/7200 bps or 4800/9600 bps.

**Remote Communications Controller:** The 3705-80 can be used as a remote communications controller (no channel connection to a host processor). This enables the 3705-80 to become a remote concentrator with a communications link to a local 3705 or 3725 communications controller. The remote communications controller

acts as an extension of the local communications controller, passing data over the communications link to the local communications controller and on to the host. For more information on the functions of a Remote Communications Controller, refer to the manual for ACF/NCP/VS.

The Remote Program Loader feature also allows for the 3705-80 to be locally attached with a channel adapter to one host, and attached remotely to another host through a local 3705 or 3725 communications controller. This allows the user to load the NCP from either source, but not at the same time.

**Business Machine Clock:** A BMC provides the clocking of data in and out of the Communications Scanner. A BMC of 134.5 bps is included in all models. Three additional BMCs can be put in the scanner. A BMC is assigned to a specific line attachment under control of the NCP, or EP. The selection of the speed of the BMC is determined with the following rules:

- No Clocking in the Modems (usually 1200 bps or less), or a Directly Attached Device:
  - All devices that attach to the modems without clocking must have a BMC and the 3705 must have a BMC of equal speed for speeds up to 2400 bps.
  - All Directly Attached Devices must have a BMC and the 3705 must have a BMC at equal speed, when the clocking is in the scanner.
- Clocking in the Modems (usually greater than 1200 bps):
  - When the modem provides the clocking, then the 3705 must have a clock of less than one-half the lowest line speed attached. The BMC of 134.5 bps meets this requirement.
- CCITT X.21 Additional Requirements for BMCs:
  - CCITT X.21 Switched: A switched line must have a BMC speed of less than 1/24th of the operating line speed. At operating speeds of 4800 bps and over, the 134.5 bps basic clock will suffice. At 2400 bps a BMC of 50 bps (#1409) is required. A BMC with a speed of 2400 bps (#1416) is also required.
  - CCITT X.21 Nonswitched: A BMC with a speed of 2400 bps (#1416) is required for testing. This BMC is in addition to the required BMC which is less than one-half the line speed. The Basic BMC of 134.5 bps meets the requirement of less than one-half the lowest line speed.

## BMC Feature Codes

Feature	Speed (bps)
#1409	50
#1410	110
#1412	200
#1413	300
#1414	600
#1415	1200
#1416	2400

An RPK may be submitted for other speeds. Field Installation: Yes. Maximum: Four clocks per machine.

**Performance:** The 3705-80 is a 4-, 10- or 16-line communications controller. The following is a definition of line parameters and NCP parameters that allow 16 lines to run in the 3705-80 with a CA1. If the communications system matches these parameters, it will run. It is always advisable to run the HONE Configurator (CF3705) to get a performance analysis.

## SDLC Operation: NCP Parameters:

Dynamic Reconfiguration  
RAS Options:  
Address trace

Auto network shutdown  
Systemabend  
Channel attention delay  
3863, 3864, 3865 Modems for LPDA  
ACF/NCP/VS R3

## Line Parameters:

Message size: 25 characters in, 256 characters out  
Half-duplex SDLC data transmission (if duplex data transmission then: 16-4800 bps lines, or 8-9600 bps lines)  
Message rate: 0.782 msg/sec  
9600 bps line speed  
2-3270 control units per line  
8-logical units per line  
Parameters as used in CF3705:  
Propagation delay: 40 milliseconds  
Number of entries in service order table: 2  
Min. time between poll cycles: 0.5 sec.  
Line turnaround time: 8.5 milliseconds  
Input data per SDLC response: 1  
Output data per SDLC response: 1  
NCP buffer size: 240 bytes

## BSC Operation: NCP Parameters:

Dynamic Reconfiguration  
All available RAS options  
3863, 3864 or 3865 Modems used for LPDA  
ACF/NCP/VS R3

## Line Parameters:

Message size: 25 characters in, 256 characters out  
Half-duplex BSC operation  
Message rate: 0.782 msg/sec.  
9600 bps line speed  
2-3270 control units per line  
8-logical units per line  
Parameters used in CF3705:  
Propagation delay: 40 milliseconds  
Number of entries in service order table: 2  
Min. time between poll cycles: 0.0 sec.  
Line turnaround time: 8.5 milliseconds  
NCP buffer size: default 64 bytes

**High-Speed Operation:** A generalized pre-definition of performance with a high-speed line (over 9600 bps) is difficult because a parameter change can cause a significant change in performance. Therefore, it is recommended that the HONE Configurator (CF3705) be used when using a high-speed attachment to predict performance of the 3705-80.

The following specific configuration will run:

SDLC with Address Substitution used. One 56K bps duplex line will run with ten 4800 bps half-duplex lines as defined above for SDLC. Other lines may run but CF3705 should be used to check this possibility.

Message size: 2,000 characters in, 2,000 characters out.  
Messages per second: 0.875 in and out.  
Data throughput at 3,500 characters per second.  
3705 to 3705 with virtual route pacing 1 for 6 PIUs (FID4).  
Parameters used in CF3705 as defined above except propagation delay of 20 milliseconds.  
The Hone Configurator (CF3705) must be run for PEP configuration.

## SPECIFY

- Power (AC, 3-phase, 4-wire): 4.3m (14 ft) cable, or specify #9986 for 1.8m (6 ft) cable (208/230V, 60 Hz only), and:

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905

380V #2816  
408V #2819

- Specify #2747 for machines to be installed in Japan. Field Installation: Yes (except 200V or frequency conversion).
- Specify #2998.
- Color: Specify #9060 for willow green, #9061 for garnet rose, #9062 for sunset yellow, #9063 for classic blue, #9064 for charcoal brown, #9066 for pearl white. Field Installation: Not recommended.
- Prior to submitting an MES order, the CE Branch Manager should be consulted for any software or hardware compatibility requirements resulting from the order.
- Machine Nomenclature: The operator panel language will be determined by one of the following specify codes. If one of the following is not specified, all countries will receive English. Warning labels will be shipped as defined for the following countries. Other countries can order using the specify codes below:

Country	Code	Warning Labels	Panel	Specify
Canada	649	English/ Canadian French	Eng.	#2934
France	706	French	Fr.	#2928
Germany	724	German	Ger.	#2929
Italy	758	Italian	Eng.	#2932
Japan	760	Japanese	Eng.	#2930
Spain	838	Spanish	Eng.	#2931

- Cables: The cables that are included in each line set are listed in the "IBM Input/Output Equipment Installation Manual - Physical Planning", GC22-7064. These cables must be ordered separately from the 3705 machine order on a cable order.

To obtain cables longer than 15m (50 ft) select the required cable below and order the cable assembly P/N and the required cable length in meters. These(Except Canada> longer cables are ordered by P/N on an MES.<) (Canada only> longer cables are ordered by P/N on cable order Form 2642.<) The cable price includes installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the (Except Canada>QSLM file<) (Canada only>FED parts price list<) for prices.

To order a cable for a CCITT V.35 Interface Modem Attachment:

Duplex (Line Set 2 #6712)  
Order cable assembly P/N 1648394 (See Note 1)  
Half-Duplex (Line Set 2 #6712)  
Order cable assembly P/N 5997479 (See Note 1)

To order a cable for a Autocall Originate (RS-366/CCITT V.25) Interface Attachment:

(Line Set 1E #4715)  
Order cable assembly P/N 1753439 (See Note 2)

Notes:

- Maximum Length: 30m (100 ft).
- Maximum Length: 45m (150 ft).

To order a cable for a EIA RS-232-C/CCITT V.24 Interface Modem Attachment:

The 3705 Communications Controller can now support a cable length of up to 100m when connecting to a 3863, 3864, or 3865 modem or equivalent. Cable lengths up to 15m (50 ft) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications.

To connect a cable longer than 15m (50 ft) the following must be done:

- Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
- If the suffix is "DG" or earlier:

A 3863 or 3864 modem or a 3865 modem which does not have Data Multiplexer #3260 installed must have EC 344120 installed.

A 3865 modem with Data Multiplexer #3260 installed must have EC 323406 installed.

- Order a cable:

Duplex or Half-Duplex Line Attachment, order cable assembly P/N 1736733.

Maximum length is 100m (328 ft).

## SPECIAL FEATURES

(No Longer Available for Models M81, M82, and M83 after December 31, 1986)

### Non-Communications Features

**Remote Program Loader (#6261):** This optional feature provides the means of remotely loading the NCP. Limitations: One per 3705-80. Cannot exist with second #1544. Field Installation: Yes.

**Two-Channel Switch (#8002):** This optional feature will connect to two S/360, S/370, 303X or 4300 Processor channels, which may be on the same host, or on a different host. Selection of which channel is used is by a manual switch on the control panel which will enable one channel at a time. Additional channel cables must be ordered with this feature. Limitations: One. Cannot be installed if two CAs are installed. Field Installation: Yes.

### Communications Features

**Channel Adapter Type 1 (CA1) (#1551):** Provides the interface between the 3705-80 and a S/370, 303X or 4300 Processor. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 Emulation mode only. The CA1 communicates with the processor byte multiplexer channel with 1, 2, 3, or 4-byte transfers. Maximum: One. Field Installation: Yes.

**Channel Adapter Type 4 (CA4) (#1544):** Provides the interface between the 3705-80 and S/370, 303X, 4300, or 9370 Processors. The 3705-80 will also attach to S/360 mdls 40, 50, 65, 67 (in 65 mode), 75 or 195 in 2701/2702/2703 in Emulation mode only. There are two modes of operation of a CA4:

- The CA4 operates like a CA1 and transfers one, two, three, or four bytes of data on the byte multiplexer channel.
- Cycle Steal Mode increases the throughput of the ACF/NCP/VS program product. Up to 248 bytes of data can be transferred across the block or selector channels.

Only one mode of operation can be used at any time. Maximum performance is obtained with the cycle steal mode of operation. The CA4 can connect to the byte multiplexer channel (like the CA1), the block multiplexer channel, or the selector channel. To run the emulator program, the CA4 must be attached to the byte multiplexer channel. Dual CA4s can connect to different channel types and each CA4 can operate in a different mode. Limitations: The first CA4 cannot exist with a #1551 and the second CA4 cannot exist with a #1551 or a #6262. Field Installation: Yes.

**Line Set 8 (LS8) (#5657):** (9600 bps CCITT X.21 Attachment) This LS provides for attachment of two duplex switched or nonswitched, or two half-duplex nonswitched synchronous lines at speeds of 2400 bps, 4800 bps or 9600 bps. For switched operation specify #9775; for

nonswitched operation specify #9777. Each specify applies to the entire LS. A switched line must have a BMC at less than 1/24th of the operating line speed. Another BMC of 2400 bps (#1416) is required for testing. Cable Group #1391 is required to attach each line. Limitations: One LS per machine. Field Installation: Yes. Use a Record Purpose-Only MES to change between switched and non-switched operation after initial installation. #9775 and #9777 are not recommended for field installation; use only on initial machine order. See the beginning of this section for more detail. Switched operation requires ACF/NCP R3. LS8 cannot be installed with #6712, #6713, #6714, #6715 or #5658. Not available on mdl M83.

**Line Set 9 (LS9) (#5658):** (48K bps CCITT X.21 Attachment) This LS provides for attachment of one duplex switched or nonswitched, or one half-duplex nonswitched synchronous line at 48K bps. For switched operation specify #9776; for nonswitched operation specify #9778. Each specify applies to the entire LS. A switched line must have a BMC at less than 1/24th of the operating line speed. Another BMC of 2400 bps (#1416) is required for testing. Cable Group #1391 is required to attach to each line. Limitations: One LS per machine. Must use Address Substitution. For a mode change, order a Record Purpose-Only MES with specify code #9776 for a nonswitched to switched mode change or #9778 for a switched to nonswitched mode change. The CE must be provided the MES number from the Record Purpose-Only MES, the specify code indicating the mode change being performed and to reference the VA000A installation instructions. Switched operation requires ACF/NCP R3. LS9 cannot be installed with #6712, #6713, #6714, #6715 or #5657. Not available on mdl M83. Field Installation: Yes.

**Line Set 2 (LS2) (#6712):** (56K bps CCITT V.35 Attachment) This LS provides for the attachment of one duplex, or two half-duplex synchronous lines, which have a CCITT V.35 type interface with lines speeds up to 56K bps (this includes line speeds of 19.2K bps and 48K bps). Half-duplex data transmission requires one even address in EP or NCP (adjacent odd addresses will be assigned); duplex data transmission requires two even addresses in NCP (adjacent odd addresses will be assigned). For duplex operation specify #9713; for half-duplex operation, specify #9714. Each specify applies to the entire line set. This LS in duplex mode is used with a LS 1Z in a 3705-II for direct attachment at 14.4K bps, or 57.6K bps; in half-duplex mode it connects to LS 1W. This LS also connects to #6715 in another 3705-80 in half-duplex mode. To attach this LS to an external modem requires one of the following cables: Attachment to a duplex line requires Cable Group #1497. Attachment to a half-duplex line requires Cable Group #496 for each modem. Limitations: One line set per machine. Uses address Substitution. A Record Purpose-Only MES does not apply. LS2 cannot be installed with #6713, #6714, #6715, #5657, or #5658. Not available on mdl M83. Field Installation: Yes.

**Line Set 3 (LS3) (#6713):** (50K bps Digital Attachment) This LS provides for attachment of one duplex synchronous line, or two half-duplex synchronous lines which have a high-speed digital interface. This LS attaches to an external modem for speeds up to 50K bps on nonswitched, or switched wideband facilities (not program supported for switched facilities). For duplex operation, specify #9715; for half-duplex operation, specify #9716. Each specify applies to the entire LS. This includes operation at 20.4K bps, 24K bps, 40.8K bps, 48K bps or 56K bps. Half-duplex data transmission requires one even address in EP, or NCP (adjacent odd address will be assigned); duplex data transmission requires two even addresses in NCP (adjacent odd addresses will be assigned). To attach to the high-speed digital interface requires Cable Group #489 for each modem attachment. Limitations: One LS per machine. Uses Address Substitution. A Record Purpose-Only MES does not apply. LS3 cannot be installed with #6712, #6714, #6715, #5657 or #5658. Not available on M83. Field Installation: Yes.

**Line Set 4 (LS4) (#6714):** (Auto Call Attachment) This LS supports four RS-366-A/CCITT V.25 interfaces for attachment of external automatic calling units. Each auto call unit works with an EIA RS-232-C/CCITT V.24 line attachment. Two Cable Groups #486 to connect to four External Auto Call Units are required. Limitations: One LS per machine. LS4 cannot be installed with #6712, #6713, #6715, #5657, or #5658. Not available on mdl M83. Field Installation: Yes.

**Line Set 5 (LS5) (#6715):** (57.6K bps Direct Attachment CCITT V.35) This LS provides for local attachment of two half-duplex synchronous devices which have a CCITT V.35 interface. Clocking is provided. Specify #9832 for 57.6K bps or #9830 for 14.4K bps. The attached device must be set for external clock control. The total cable length must not exceed 60m (200 ft) at 14.4K bps operation, and 30m (100 ft) at 57.6K bps operation. The total length includes the attached device cable length. Each specify applies to the entire LS. This LS can connect to a LS 2 in another 3705-80 in half-duplex mode. Cable Group #1394 is required to attach each device. Limitations: One LS per machine. Uses Address Substitution. For a speed change, order a Record Purpose-Only MES with specify code #9832 for a 14.4K bps to 57.6K bps, or #9830 for a 57.6K bps to 14.4K bps. The CE must be provided the MES number from the Record Purpose-Only MES, the specify code indicating the speed change and to reference the VA000A installation instructions. LS5 cannot be installed with #6712, #6713, #6714, #5657, or #5658. Not available with mdl M83. Field Installation: Yes.

**3705-M84:** The 3705-M84 has ten line attachments. The four CCITT V.24 lines should have duplex (#9711) or half-duplex (#9712) specified on the initial order. All CCITT V.24 lines not specified will be shipped as half-duplex. The six CCITT X.21 lines should have either switched (#9775), or nonswitched operation (#9777) specified on the initial order. All CCITT X.21 lines not specified will be shipped as switched lines. One specify code applies to two lines. To change the mode of operation on the M84, follow the procedure outlined for CCITT V.24 lines and the following procedure for CCITT X.21 lines.

**CCITT X.21 Line Attachments:** #9775 and #9777 are not recommended for field installation. To change the mode of operation between switched or nonswitched operation on CCITT X.21 lines, order a Record Purpose-Only MES: Specify #9724 to change one or more line attachments from nonswitched to switched. Specify #9725 to change one or more line attachments from switched to nonswitched. The CE must be provided the MES number from the Record Purpose-Only MES, the specify code(s), and the Line Interface Address(es) to be changed with each associated Specify Code, and reference the VA000A installation instructions.

## MODEL CONVERSIONS

(No Longer Available for Models M81, M82, and M83 after December 31, 1986)

The following 3705-80 model conversions are field installable. Other model conversions are not recommended.

Models	Conversion Time
M81 to M82	5.9 hours
M82 to M83	3.4 hours
M81 to M83	7.9 hours
M81 to M84	7.5 hours

- EIA RS-232-C/CCITT V.24: All Line Attachments will be shipped in half-duplex mode on model conversions. Do not use specify codes #9711 or #9712.
- CCITT X.21: Line Attachments will be shipped in switched mode on model conversions. Do not use specify codes #9775 or #9777.

## ACCESSORIES

(No Longer Available for Models M81, M82, and M83 after December 31, 1986)

**Keys:** The 3705-80 with Operator Panel Lock is shipped with two keys. Additional or replacement keys may be purchased only from IBM. A customer letter of authorization with key identification number (stamped on key) must accompany each order. Allow 6 to 7 weeks for shipment.

## SUPPLIES (NONE)

## 3708 NETWORK CONVERSION UNIT

### PURPOSE

The 3708 Network Conversion Unit is an advanced networking product which concurrently provides line concentration, protocol conversion, protocol enveloping, and ASCII pass-through for attached ASCII/asynchronous devices. An ASCII/asynchronous terminal attached to a 3708 can use host applications that support full screen 3270 displays and printers. IBM host applications can also communicate through the 3708 with devices which otherwise would connect through the Network Terminal Option (NTO) licensed program running on a 37X5. ASCII/asynchronous terminals can also connect through the 3708 to an ASCII host application.

### DESCRIPTION

A total of ten ports is provided for host and terminal attachment. The 3708 can be multidropped on an SNA/SDLC line with other SNA controllers. It provides SNA networking facilities and CNM support when operating with SNA hosts and applications.

Attachment to one or two IBM host processors using the SNA/SDLC protocol is provided. The 3708 also provides the capability for an ASCII display to communicate point-to-point with an ASCII host processor in pass-through mode. ASCII/asynchronous devices may be attached to a 3708 directly at distances up to 4,000 ft or remotely via switched or nonswitched lines. ASCII hosts must be attached to the 3708 via an EIA RS-232-C interface, either directly or via non-switched lines.

The 3708 does not require any new or unique IBM host software. The 3708 will operate with IBM SNA based MVS, VM, and VSE host programs which support the 3274-51C or 61C with Configuration Support A. The 3708 can also perform the functions of NTO to IBM SNA applications which support the NTO licensed program. For terminals attached in this mode, it is not necessary to have NTO installed in the 37X5. The 3708 is also supported by the SNA communication network management product NetView.

When the 3708 is used to connect an ASCII display to an ASCII host via pass-through, the 3708 is transparent to both ends. Any menu-selectable ASCII display terminal can attach through the 3708 to an ASCII host which supports that terminal.

IBM systems to which the 3708 can attach include: System/370, 43XX, 30XX, and 9370 operating with a 3705, 3725, or 3720 Communication Controller, a 4361, 4331, or 4321 through the Communication Adapter (CA), a 9370 via the Telecommunications Subsystem Controller, an 8100 via the Data Link or Direct Attach, a System/36 or System/38 via the Communication Attachment, using the 3274 Remote Attach Support, and a 4701 Model 003 Finance Communication Controller or 4702 Branch Automation Processor (using the Alternate Line Attachment Adapter, SNA Primary. The 3708 can attach to a 3710 Network Controller. The 3708 can also be attached to one or more ROLM CBX II 8000 or 9000 systems.

The 3708 also provides for configuration, monitoring and problem determination through the attachment of a user-provided control terminal. The control terminal may be any one of the menu-selectable ASCII display terminals. The control terminal may either be directly attached to the 3708 or remotely attached via a switched or nonswitched line.

The 3708 Pluggable Cartridge with Central Site Configuration is an enhanced cartridge that enables the centralized control of the operational characteristics of the 3708 Network Conversion Units. The Pluggable Cartridge with Central Site Configuration is used instead of the current Pluggable Cartridge. A central site configuration aid that runs on an IBM Personal Computer is included with the Pluggable Cartridge with Central Site Configuration. The Pluggable Cartridge with Central Site Configuration also includes all of the function of the Pluggable Cartridge.

### MODELS

#### Model 001

**Customer Setup:** The 3708 is designed to be setup by the customer. During the Customer Setup (CSU) process the customer verifies, using the internal diagnostics, that the 3708 hardware is operational. The customer must then configure the 3708 to allow host/device attachment. The configuration data reside in non-volatile storage in the 3708 and are retained should a power failure occur. The 3708 comes pre-configured to allow the control terminal access.

### HIGHLIGHTS

- Supports line concentration, protocol conversion, protocol enveloping and ASCII host pass-through concurrently
- Supports IBM Personal Computers with PC/HOST File Transfer and Terminal Emulator Program (FTTERM).
- Supports IBM Personal System/2 family of personal computers and ProPrinters.
- Provides easy to use menus to allow a terminal user access to one of two possible IBM host processors or one of multiple possible ASCII host processors
- Extends SNA networking capabilities to 3708-attached ASCII terminals
- Extends CNM support by providing alerts and collecting performance statistics
- Supports an easy to use control terminal for menu-driven remote or local management of the 3708
- Provides an optional Pluggable Cartridge with Central Site Configuration that enables the centralized storage, updating and distribution of 3708 configuration information and micro-code changes.
- Supports a wide variety of popular ASCII/asynchronous display terminals
- Supports switched ASCII devices connected to the ROLM CBX II 8000 and 9000
- Allows up to six "User-Defined Terminals" to support keyboard mappings not supplied by IBM
- Provides a 7171 compatible translate table and a user-definable translate table to be used in ASCII-to-EBCDIC and EBCDIC-to-ASCII character translation.
- Saves configuration information in non-volatile memory, where it will not be lost in the event of a power failure.
- Supports the 3270 status line, highlighting and 4-color features
- Provides type-ahead key queuing and enhanced null/blank processing
- Supports ASCII printers in three modes: System print, local copy and shared printing
- Permits a display with an attached printer to share a single port in protocol conversion mode
- Supports line speeds from 110 to 19.2K bps
- Provides device attachment using the CCITT V.24/EIA RS-232-C interface for direct or remote attachment or the CCITT V.11/EIA RS-422-A interface for direct attachment of ASCII displays up to 1,219m (4,000 ft) away

- Provides auto baud/auto parity and auto answer/auto disconnect
- Supports optional port passwords
- Enhances customer problem determination capability by supporting remote diagnostic assistance by IBM support specialists

**Standard Features:** The 3708 Network Conversion Unit is composed of:

- One 3708 base unit - model 001
- One power cord - 4.3m (14 ft) is standard and will be shipped with the 3708. If a 1.8m (6 ft) power cord is required, specify #9986
- One CCITT V.24/EIA RS-232-C Wrap Plug
- One #3524, Pluggable Cartridge, or one #3525, Pluggable Cartridge with Central Site Configuration. (Note: At least one cartridge #3524 or #3525 must be ordered. Additional cartridges #3524 or #3525 may be ordered via MES using P/N 6405322 or P/N 6405473).

**Customer Replacement Parts:** The following parts must be purchased by the customer when a replacement is needed.

Order through Branch Office Parts Station and/or Field Part Distribution Centers to NSD Greencastle or the customer directly places orders to the IBM Parts Order Center in Greencastle.

RS-232-C wrap plug                      6405345  
14 ft power cord                      \* see below  
Field packing material                6165643

**Ordering Spare Cartridges:** Cartridges may be ordered by P/N in any quantity to provide spare cartridges as required by the customer. Cartridges purchased as spare units are eligible only for IBM Hourly Service coverage after warranty. Cartridges are not eligible for volume discounts if ordered as spares.

Pluggable Cartridge: 6405322

Pluggable Cartridge with Central Site Configuration: 6405473

**Warranty/Maintenance for Spare Elements:** (Countries with Repair Center Capability) Spare elements are covered under a one (1) year warranty. The specific service offering for this warranty is Customer On-site Exchange. <)

(Countries without Repair Center capability) Spare elements are covered under a one (1) year warranty. The specific service coverage for this warranty is IBM On-site Repair. <)

Maintenance for spare machine elements, after the warranty period, is available on an IBM Hourly Service basis at an IBM Repair Center. A minimum charge is applied.

**Security:** User access to the 3708 can be controlled by requiring users to enter a password in order to gain access to a port. Passwords are assigned from the control terminal, and can be different for each port. Each 3708 port can optionally be configured without port passwords so that IBM host application passwords are all that is necessary to logon. Access to hosts and printer can be defined through the configuration.

SNA session security is supported. When an ASCII device is in session with an IBM SNA host and either disconnects or exceeds the configurable inactivity timer the 3708 will terminate the session. Another device is NOT allowed to dial into a port and gain access to a SNA session which was previously defined, but not yet terminated. Session disconnect from the IBM SNA host is also supported. If the IBM SNA host subsystem or application supports the NOTIFY command, the 3708 provides power on/off notify whenever the terminal connects/disconnects or is timed out by the 3708 due to inactivity.

The 3708 cannot provide security for host subsystems or applications (such as IMS) which retain data between sessions in the expectation that when the same logical unit comes into session again, it will still be same terminal and user. For example, IMS maintains the conversation even though the session with a workstation was

ended. Subsequent access to the same port of the 3708 by a different workstation would allow a new user access to the data queue established during the previous session.

**Customer Responsibilities:** The customer is responsible for:

- Ordering the following manuals for setup and planning:
  - "IBM 3708 Network Conversion Unit Planning and Installation" (GA27-3766)
  - "IBM 3708 Network Conversion Unit Problem Determination" (GA27-3767)
  - "IBM 3708 Network Conversion Unit Description" (GA27-3768)
  - "IBM 3708 Network Conversion Unit End-User Reference" (GA27-3765)
  - "IBM 3708 Network Conversion Unit Configuration Samples" (GA33-6000)
  - "IBM 3708 Network Conversion Unit Reference Cards" (Keyboard Reference Cards for the supported terminals). Form numbers are listed in the "IBM 3708 Network Conversion Unit Planning" manual.
- Adequate site preparation and planning for the port configurations and physical security of the 3708
- Procurement of all communication cables for IBM host, ASCII host and ASCII/asynchronous device attachment
- Receipt at customer's receiving dock, unpacking and placement of the 3708
- Setup of the 3708 and connection of cables to communication lines, modems and processors
- Setup of the modems and attached devices
- Identifying and supplying a suitable ASCII display terminal or Personal Computer to be used for entering configuration data
- Configuration of the 3708
- IBM SNA host "system generation" to accommodate the 3708
- Verifying that equipment operating with the 3708 meets customer criteria
- Price quotations, installation and cost of common carrier equipment and service
- Determining 3708 spare equipment requirements
- Performing Customer Problem Analysis and Resolution

Providing a telephone line and a 1200 bps, auto-answer, duplex, (Canada only) >212A <) compatible stand-alone modem with auto-answer, such as the 5841, to obtain remote IBM assistance.

**Cables:** Order cables by MES, using the MSORDER transaction and order as CABLES.

- All external cables, both CCITT V.24/EIA RS-232-C DTE and DCE standard length cables and CCITT V.11/EIA RS-422-A variable length cables.

All external cables for the 3708 must be ordered separately and are chargeable items. Allow a lead time of at least two weeks for fixed length RS-232-C cables and four weeks for variable length RS-422-A cables.

Procurement of equivalent cables through an alternate vendor is the customer's responsibility. Cables should be shielded. See the publication "3708 Network Conversion Unit Planning and Installation" (GA27-3766) for cable descriptions and specifications.

See "Accessories" for details.

**Publications:** The following publications ship with the 3708:

"IBM 3708 Network Conversion Unit Setup" (GA27-3611)

"IBM 3708 Network Conversion Unit Problem Report" (GA27-3638)

"IBM 3708 Network Conversion Unit Registration Address Form"

The following publication is available from Mechanicsburg at announcement: "IBM 3708 Network Conversion Unit Planning and Installation" (GA27-3766)

The following publication will be available two weeks prior to General Availability: "IBM 3708 Network Conversion Unit Planning and Installation" (GA27-3766)

The following publications will be available at General Availability:

"IBM 3708 Network Conversion Unit Planning and Installation" (GA27-3766)

"IBM 3708 Network Conversion Unit Problem Determination" (GA27-3767)

"IBM 3708 Network Conversion Unit Configuration Samples" (GA33-6000)

"IBM 3708 Network Conversion Unit Reference Cards" (Keyboard Reference Cards for the supported terminals)

Form Numbers are listed in the "IBM 3708 Network Conversion Unit Planning and Installation" manual.

## SPECIFIED OPERATING ENVIRONMENT

**Hardware Requirements:** The 3708 is designed to operate in a standard office environment either directly or remotely attached to one of the following IBM products:

- 3705, 3720, 3725 - Communication Controller (attached to a 3090, 308X, 303X, 43XX, or System/370)
- 3710 - Network Controller
- 9370 - Communication Adapter
- 4361 - Communication Adapter (ICA)
- 4331 - Communication Adapter (ICA)
- 4701 Model 003 - Finance Communication Controller
- 4702 Branch Automation Processor
- 4321 - Communication Adapter (ICA)
- 8100 - Data Link Attach
- 9370 Telecommunications Subsystem Controller
- S/36 - Communication Attachment (using the S/36 3270 Remote Attachment Support)
- S/38 - Communication Attachment (using the S/38 3274 Remote Attach Support)
- ROLM CBX II - 8000 Business Communication System
- ROLM CBX II - 9000 Business Communication System

Attachment to the 4361, 4331 and 4321 Communications Adapter (CA), the 9370, and the System/36 and System/38 is supported in protocol conversion mode only.

The 3708 is designed for customer setup. All of the 3708's microcode is contained in the pluggable cartridge. The 3708 may be used for either table top or rack mounted operation.

## Software Requirements

**Host Software Support:** The IBM 3708 is designed to operate in an existing SNA network without any new or additional host software requirements. The 3708 permits users to attach to any application on the supported operating systems that currently supports the IBM 3274-51C or 3274-61C (SNA) under Configuration Support A. Certain 3270 keys and functions are not supported. They are:

- ALT CURSOR
- APL/TEXT
- ASCII option
- Attribute select keys
- Clicker on/off
- Compression of symbol definition bit strings
- Encrypt/decrypt
- Extended data streams

- IBM 3274 log/test facility
- Katakana
- Light-pen
- Magnetic readers
- Mono/dual case control of IBM 3278 Printer
- More than 4-color support
- Programmed symbols
- Screen sizes larger than 1920 characters
- SFAP options

- SI print order
- Test request read
- User-defined alerts

**Host Software Attachment:** The 3708 attaches to ACF/NCP V2 or V3 in a 3705, ACF/NCP V2, V3, or V4 in a 3725, and to ACF/NCP V4 in a 3270.

If the host operating system is MVS/XA, MVS/370, VSE SP1.1 or VSE SP2.1 the 3708 is supported by ACF/VTAM V2 and V3. If the host operating system is VM/SP R4 (with or without HPO), the 3708 is supported by ACF/VTAM V3 for VM/SP. The 3708 is supported by ACF/TCAM V3 and ACF/TCAM V2R4. ACF/TCAM V2R4, with the MSNF feature, supports the 3708 for device to application (LU-LU) sessions. However, SSCP ownership of 3708 PUs and LUs must be provided by a VTAM host.

When the 3708 is attached to an 8100, it is supported by DPPX/SP R3. Considerations for attachment to an 8100 system are found in the 3708 Network Conversion Unit Planning manual.

On a System/38, the 3708 is supported by CPF R7 and the System/38 3274 Remote Attach Support. System/36 support is provided via the Communication Attachment (using System/36 3270 Remote Attachment Support). The 3708 is supported by System Support Program Release 5 and the System/36 3270 Remote Attach Support.

4700 support is provided via the 4701 Model 003 - Finance Communication Controller or 4702 Branch Automation Processor (attachment to 4700 is via the Alternate Line Attachment Adapter, SNA Primary). Configure the 3708's upstream prot for "TERMSELF" instead of "UNBIND". This 3708 configuration option is supported by the 3708 cartridge EC A58775, available in January 1987.

Other host subsystems and applications which support the 3708 are:

- NetView
- NCCF - V2R1, V2R2
- NPDA - V3
- NLDM - R2, R3
- CICS - R1.6
- IMS - R1.3
- TSO - R1.1
- PROFS - R2.2
- NRF with ACF/NCP V4
- MXXX

The 3708 in protocol conversion mode appears as a 3274-51C or 61C to IBM SNA host programs (e.g., IMS, CICS, TSO and CMS) and 3274 application programs. The 3708 also presents an NTO interface to an IBM SNA host and customer applications that previously required the NTO licensed program.

**Device Attachment:** The display terminals mentioned in this document are products of the following companies and have been tested at the level defined by the following documentation:

- VT52, VT100 - "User Guide VT100", by Digital Equipment Corporation, dated June 1981 (third edition), Catalog #EK-VT100-UG-003.
- VT220 - "VT220 Owner's Manual", by Digital Equipment Corporation, dated Sept 1983 (first edition), Catalog #EK-VT220-UG-001.
- TeleVideo 910 - "TeleVideo Model 910 CRT Terminal Installation and User's Guide", by TeleVideo Systems, Inc. (document #B2002500 Revision D), April 1983 edition.
- TeleVideo 950 - "TeleVideo Model 950 CRT Terminal Installation and User's Guide", by TeleVideo Systems, Inc. (document #B300002-001 Revision B), April 1982 edition.

- Beehive ATL-078 - "ATL-078 Technical User's Manual", (document #TM0184-0006-1) dated April 1984 revised 7/84, version 1.1 by Beehive Int.
- Lear Siegler ADM 3A - "ADM 3A Dumb Terminal Video Display Unit User's Reference Manual", by Lear Siegler, Inc. (document #DP2190683F), June 1983 edition.
- ADDS Viewpoint - "ADDS Viewpoint User's Manual", by Applied Digital Data Systems, Inc., document 518-30000, dated January 19, 1981, revised May 1981.
- Hazeltine 1500 - "Hazeltine 1500 Video Display Terminal Reference Manual", by Hazeltine Corporation, July 1977 edition (document #HI-1056A).
- ESPRIT I - "ESPRIT I Video Display Terminal Reference Manual", by Hazeltine Corporation, June 1983 edition (document #HI-1094 Revision B).
- ESPRIT II - "Hazeltine ESPRIT II Video Display Terminal Reference Manual", by Hazeltine Corporation, September 1982 edition (document #HI-1109 Revision A).
- Teletype 5410 - "5410 Asynchronous Display Terminal User's Guide", by AT&T Teletype Corporation, Manual 605 Issue 2, May 1984.
- Teletype 5420 - "5420 Buffered Display General Technical Reference", by AT&T Teletype Corporation, March 1984 edition (document #SD5420-401).
- Northern Telecom Displayphone - "Displayphone Telephone and Data Terminal Reference Manual", by Northern Telecom (publication #P5849), Revision A, dated February 1984 (firmware release AA07) and "Displayphone Telephone and Data Terminal User Guide", by Northern Telecom, (publication #P5840), Revision F, 1983.
- Hewlett Packard 2621B - "Hewlett-Packard Interactive Terminal 2621B Owner's Manual", by Hewlett-Packard Company (document #02620-90062U1282), Revision 1, December 1982.
- Data General D210 - "Dasher D210/211 Display Terminal User's Manual", by Data General Corporation (document #014-000746-01), Revision 1, February 1984.

## Pluggable Cartridge with Central Site Configuration

### Specified Operating Environment

#### Hardware Requirements:

- IBM Network Conversion Units must have either a Pluggable Cartridge (#3524) or a Pluggable Cartridge with Central Site Configuration (#3525) to operate. The enhanced configuration management and microcode change distribution is provided only with the Pluggable Cartridge with Central Site Configuration.
- An IBM Personal Computer with:
  - A 5.25 inch diskette drive
  - A hard disk
  - An IBM Color/Graphics or Monochrome adapter attached to an 80-column display
  - A minimum of 512K of storage
  - Telecommunications equipment and facilities (switched, non-switched, or direct connect) as required to provide:

Asynchronous data communication with an IBM 3708 downstream port configured as a control terminal port to send/receive configuration information or the microcode patch area to/from the IBM 3708

File transfer to the IBM SNA host processor to send the NetView CLISTs for downloading to the IBM 3708s

#### Software Requirements:

- IBM Personal Computer DOS Version 2.0 or later
- EZ-VU Runtime Facility Version 2 (6317025)

#### Optional Software:

The IBM 3708 central site configuration aid can prepare configuration information in the form of NetView CLISTs for downloading via the SNA host link to the IBM 3708. The following host programs support this mode of operation:

- NetView
- NCCF Version 2 Release 2

The customer must provide file transfer software support between the IBM Personal Computer and the SNA host.

Added diagnostic capability can be provided through the use of the IBM Personal Computer and the central site configuration aid running in "control terminal" mode. In this mode, the IBM Personal Computer can retrieve the alerts and error logs. The software that can support this mode of operation is:

- IBM 3101 Emulator Program (6024-042)
- PC/HOST File Transfer and Terminal Emulator Program (6476-052)

640KB of memory on the IBM Personal Computer is required to support this function.

## ATTACHMENT INTERFACES

**IBM SNA Host Attachment:** IBM systems to which the 3708 can attach include:

- System/370
- 4341, 4381, 9370, and 30XX operating with a 3705, 3725, or 3720 Communication Controller
- 4361, 4331, or 4321 through the Integrated Communication Adapter (ICA)
- 4701 Model 003 - Finance Communication Controller
- 4702 Branch Automation Processor
- 8100 via the Data Link or Direct Attach
- 9370 Telecommunications Subsystem Controller
- S/36 - Communication Attachment (using the S/36 3270 Remote Attachment Support)
- S/38 via the Communication Attachment, using the System/38's 3274 Remote Attach Support.

The 3708 can also attach to an IBM 3710 Network Controller.

The 3708 is implemented as an SNA physical unit - type 2. This is the same as the IBM 3274-51C/61C Display Control Unit and permits the 3708 to be multidropped on the same SNA/SDLC line with other SNA devices.

The IBM host can be attached to the 3708 via a direct connection or via a communication link (either nonswitched point to point or multipoint). Communication is half-duplex on either half-duplex or duplex communication facilities. Connection is via a standard CCITT V.24/EIA RS-232-C interface. Data rates up to 19.2K bps currently on each upstream link to the IBM SNA host(s) are supported where facilities and support are available. Internal and external clocking and both NRZI and NRZ are supported. See the M2700 pages for facilities.

IBM modems that the 3708 can be attached to include:

Modem (models)	Speed (bps)	Lines
3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1	2400/1200	Nonswitched voice grade
3864-1	4800/2400	Nonswitched voice grade
3865-1/2	9600/4800	Nonswitched voice grade
3868-1	2400/1200	Nonswitched

3868-2	4800/2400	voice grade Nonswitched
3868-3/4	9600/4800	voice grade Nonswitched
5811-10	2400/4800/ 9600	voice grade Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400/4800/ 7200/9600	Nonswitched baseband
5811-28		Rack mount version of 5811-20
5812-10	2400/4800/ 7200/9600	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-2/3	9600/7200/ 4800	Nonswitched voice grade
5866-2/3	14400/9600	Nonswitched voice grade
5868-51/52		Rack mount version of 5865-2
5868-062		Rack mount version of 5866-1/2

**Note:** 4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

The IBM 5841 can be used on the ASCII links at speeds up to 1200 bps. The IBM 1200 bps internal modem can be used with IBM Personal Computers attached to a 3708. All of these modems are attached via an EIA RS-232-C interface.

**ASCII Host Attachment:** The 3708 can be attached to one or more ASCII hosts. Attachment can be direct connection or via a non-switched point to point communication link. Data rates of up to 19.2K bps are supported. Connection is via a standard CCITT V.24/EIA RS-232-C interface. The CCITT V.11/EIA RS-422-A interface is not supported. Duplex communication facilities are required. Clocking is internal only.

**ASCII/Asynchronous Device Attachment:** Attachment characteristics of ASCII/asynchronous devices can be either direct or point-to-point nonswitched or switched. Auto answer/auto disconnect are supported. Data rates from 110 to 19.2K bps are supported. Auto baud recognition (auto baud/auto parity) is provided for devices on switched lines at speeds up to and including 9.6K bps. The 3708 supports both the CCITT V.24/EIA RS-232-C interface and the CCITT V.11/EIA RS-422-A interface for attaching devices. For direct attachment the distance between the attaching devices is up to 15m (50 ft) for a CCITT V.24/EIA RS-232-C connection and up to 1,219m (4,000 ft) for a CCITT V.11/EIA RS-422-A connection. The CCITT V.11/EIA RS-422-A signaling level interface is designed to function with the 3101, 3161, 3162, 3163, and 3164 ASCII/asynchronous displays. TP attachment via nonswitched or switched lines requires an asynchronous external modem with a CCITT V.24/EIA RS-232-C interface. Clocking is internal only.

Attachment of the ROLM terminals CYPRESS, CEDAR, JUNIPER, and ROLMPHONE 244PC is via the ROLM CBX II. The 3708 may be attached to one or more ROLM CBX II 8000 or 9000 systems. Connection of the 3708 to the ROLM CBX II is through a ROLM DataCom Module (DCM), a ROLM Data Terminal Interface (DTI), or an Integrated Personal Computer Interface (IPCI) card.

**Security, Auditability and Control:** The 3708 utilizes the security and auditability features of the host hardware and software.

User management is responsible for evaluation, selection, and implementation of security features, for administrative procedures, and for appropriate controls in application systems.

If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography.

**Note:** Cryptography must be performed external to the 3708.

## HOST/TERMINAL ATTACHMENTS

The 3708 provides a total of ten ports for host and terminal attachment. For example, if one port is used for attachment to an SNA host, then nine ports are available for ASCII/asynchronous terminal or ASCII host attachment. If two ports are used for SNA host attachment and two ASCII hosts are attached, then six ports remain for ASCII/asynchronous terminal attachments.

**Attachment to an SNA Host:** Each ASCII/asynchronous device communicating with an IBM SNA host can operate in one of two modes:

Protocol conversion mode:

The 3708 is a protocol converter that allows ASCII/asynchronous devices, such as display terminals, printers, keyboard/printers, and personal computers to appear to an IBM SNA host as 3270 displays and printers. The 3708 converts the 3270 data stream to and from ASCII to permit ASCII devices access to 3270 applications programs on the host system. ASCII/asynchronous plotters can also be attached in this mode. The plotter appears the same to the host as a 3287 printer.

The 3708 in protocol conversion mode allows a display with an attached printer to share a 3708 port and appear to the host as two logical units. A user can communicate with the host processor from the display and have output sent to the printer over a single connection. This feature of the 3708 permits a remote user to realize a significant cost saving by having both display and printer capability on only one communication line.

Protocol enveloping mode:

The 3708 provides a protocol enveloping function, allowing TWX 33/35 compatible displays and keyboard/printers to communicate over an SNA/SDLC line attached to an IBM SNA host system through a 37X5 with NCP or a 3720 with NCP. The terminal's appearance to host applications is the same as a TWX 33/35 terminal connected through the Network Terminal Option (NTO) licensed program. For TWX compatible devices, the NTO function resides in the 3708 so that NTO does not need to be installed in the 37X5. Protocol enveloping mode can also be used to allow plotters and other ASCII/asynchronous devices to receive and transmit 8-bit transparent (256 character codes, or binary) data.

The 3708 can be attached to one or two IBM SNA host processors. Each connection is supported as a separate physical unit (PU). Dual connection means a device can selectively attach to one of two different IBM SNA hosts or select one of two links to the same IBM SNA host. Selection is made from the user's terminal at logon time. Eight ports are available for ASCII/asynchronous devices and ASCII host attachment when the 3708 is configured for two SNA/SDLC lines to IBM hosts.

The 3708 provides product specific alerts in Network Management Vector Transport (NMVT) format, and is supported by NetView. The 3708 also provides response time statistics similar to those provided by the 3274 when used in conjunction with NetView.

The 3708 can also use NPDA's V3R1/V3R2 non-product specific alert support facility. When the 3708 is connected to two IBM SNA hosts, it will send alerts to the host which owns the resource for which the alert is being sent. Alerts concerning resources not owned by either host will go to both hosts.

When an ASCII display and ASCII host are connected through the 3708 (operating in pass-through mode), central site problem determination will be enhanced because alerts for these resources will be sent to NetView or NPDA (to one or both IBM SNA hosts), even

though the resource does not belong to an SNA host. Alerts are also logged for display at the control terminal.

The 3708 will perform a Response Time Monitor (RTM) function similar to that of the 3274 interacting with the current release of NetView or NLDL V1R2/V1R3. RTM calculates the response time for each transaction and summarizes the result for each ASCII display being monitored. The 3708 will maintain five counters associated with each logical unit and track the number of transactions which fall in specified time ranges. The RTM function applies only to displays operating in protocol conversion mode. The control terminal will also be capable of displaying Response Time Monitor (RTM) counters.

**Attachment to an ASCII Host Processor:** The 3708 may be attached to one or more ASCII hosts. When connecting an ASCII/asynchronous display terminal to an ASCII host via the 3708, the 3708 is transparent to both the terminal and the host. This connection is called pass-through. The terminal user selects an ASCII host at logon time via a menu. If the ASCII host is available, connection will be established. Communication between the ASCII display and the ASCII host through the 3708 is always point-to-point. The line speeds and protocols of the ASCII display and the ASCII host must be the same. Only one ASCII display can communicate on the same link with an ASCII host at one time. Error checking is the responsibility of the ASCII host.

**ASCII Display Support:** ASCII/asynchronous devices may be attached directly up to 1,219m (4,000 ft) or remotely via switched or nonswitched lines.

**Mode Selection:** Via a menu at logon time, a user may select one of the following: One of two SNA/SDLC links to different IBM hosts, or one of two SNA/SDLC links to the same IBM host or one of multiple links to an ASCII host or hosts. A 3708 port can be pre-configured to allow an ASCII/asynchronous display to operate in protocol conversion mode, protocol enveloping mode, or be allowed to have the mode be dynamically selectable by the BIND from the IBM SNA host application.

**Protocol Conversion Mode:** In protocol conversion mode an ASCII display terminal operating in character mode attached to the 3708 is treated as one of the following IBM display units with a 1920 character screen (24 rows x 80 columns):

- 3278 model 2
- 3279 model 2A (in either monochrome or 4-color support)
- 3178 or
- 3179 (in either monochrome or 4-color support)

**Note:** For simplicity, all future references will state the 3178 as the emulated device.

The 3708 provides the necessary data stream conversion and translation from/to EBCDIC/ASCII that allows an ASCII display to emulate most of the full screen formatting and keyboard functions of a 3178 Display Unit.

The user identifies via a menu at logon time what kind of ASCII display to be used. The following ASCII displays have keyboard mappings pre-defined in the 3708:

- IBM 3101 models 10, 12, 13, 20, 22 and 23
- IBM PC in 3101 mode with 3101 standard keyboard functions
- IBM 3161 ASCII Display Station (in native mode)
- IBM 3162 ASCII Display Station
- IBM 3163 ASCII Display Station (supported as a 3161)
- IBM 3164 ASCII Display Station
- ROLM - CYPRESS, CEDAR and JUNIPER (via ROLM CBX II)
- DEC (Digital Equipment Corporation) VT52, VT100, and VT220
- Hewlett Packard 2621B
- Data General - D210
- Hazeltine model 1500, ESPRIT I and II
- TeleVideo 910 and 950
- Lear Siegler model ADM 3A
- BEEHIVE ATL-078
- ADDS - Viewpoint
- TELETYPE - models 5410 and 5420

## NORTHERN TELECOM Displayphone

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Personal computers, operating in emulation mode as one of the above displays, can also attach provided an emulation program is available and compatible with one of the 3708's supported keyboard mappings.

In addition to the menu selectable display support listed above, other ASCII displays can be attached using the 3708 feature called "User-Defined Terminals" (UDTs). Up to six different tables supporting other ASCII display types not listed above can be configured by the control terminal operator to attach to a 3708. The UDTs can also be used to store redefinitions of the keyboard mappings for the menu selectable displays. The ASCII display to be attached as a "User-Defined Terminal" must be capable of operating in character mode, support the ANSI 3.4 - 128 character set and must be supported by one of the screen addressing classes as defined in the "3708 Network Conversion Unit Planning and Installation" manual.

The 3708 provides a standard EBCDIC/ASCII translate table as defined in ANSI 3.4 - 128 ASCII. One additional user defined translate table may be configured by the control terminal operator.

Highlighting and 4-color support in the 3270 data stream is supported if the ASCII device maps to the characteristics for color and highlighting as defined in the "3708 Network Conversion Unit Planning" manual. Light-pen application compatibility can be simulated using the Cursor Select key. Light-pens are not supported. The 3708 emulates the status line of the 3178 display. The status line is displayed on the 25th line if the ASCII display supports an addressable 25th line. Otherwise, the status line can be switched on/off by the user on the 24th line of the screen with a keystroke sequence.

Two features are provided on the 3708 to enhance productivity. They are type-ahead key queuing and enhanced null/blank processing. Type-ahead key queuing provides the user with the capability of entering keystroke sequences without waiting for a completion of a screen write. This is a very productive feature when an ASCII display or personal computer is attached through a low-speed switched connection. Enhanced null/blank processing allows the user to use either the space bar (blank characters) or the cursor move keys (nulls) to edit and separate fields. When the enter key is depressed the 3708 will convert imbedded nulls to blanks. Therefore, the data sent to the host contains blanks wherever there was either a blank or a null on the screen, and the format reflects the screen positioning of the data that the user saw displayed. Both of these functions are selectable by the user.

**Protocol Enveloping Mode:** In protocol enveloping mode, ASCII displays communicate as LU1, TWX 33/35 devices (NTO emulation). Communication is line-by-line. 8-bit transparent (256 character codes, or binary) data transfer is supported in this mode.

## ASCII Keyboard/Printer Support:

- Protocol Conversion Mode:

In this mode, the keyboard/printer is supported as a printer only. The following keyboard/printer input functions are supported:

- Cancel Print, in LU1 SNA Character String (SCS) mode
- PA1 (Program Attention), in LU1 SCS mode
- PA2 in LU1 SCS mode
- Enable Print/Hold Print (LU1 SCS mode and LU3 Data Stream Compatibility (DSC) mode)

A single keyboard map will be supplied to support all keyboard/printers for the PA1, PA2, Hold Print/Enable Print and Cancel Print functions.

- **Protocol Enveloping Mode:**

In protocol enveloping mode, ASCII keyboard/printers communicate as LU1, TWX 33/35 devices (NTO emulation). Communication is line-by-line. 8-bit transparent (256 character codes, or binary) data transfer can be supported in this mode.

**ASCII Printer Support:**

IBM printers that the 3708 can be attached to include:

- 4201 ProPrinter II
- 4202 ProPrinter
- 4207 ProPrinter X24
- 4208 ProPrinter XL24

The printers listed above require Serial Attach Module #3000.

- **Protocol Conversion Mode:**

ASCII printers are supported as a 3287 model 1 or 2. Printers are supported as LU1 (SCS mode) and/or LU3 (DSC mode). Buffered and unbuffered printers are supported.

The following printer characteristics determine which ASCII printers can be supported by the 3708. If an ASCII printer has these characteristics, it is supported by the 3708:

- Asynchronous duplex communication
- Line speeds from 110 to 19.2K bps
- Serial interface CCITT V.24/EIA RS-232-C
- ANSI 3.4 - 128 ASCII character set (A user-defined translate table may be defined by the control terminal operator to translate other ASCII character sets.)
- Maximum line length of 255 characters
- Carriage return does not generate a line feed
- Line feed does not generate a carriage return
- Delete characters (X '7F') are ignored
- DC1/DC3 are used for XON/XOFF pacing
- 7-bit data with or without parity and 8-bit data without parity in LU1 SCS mode are supported.

- **Protocol conversion provides printer support in three modes:**

- **System mode:** In this mode, the printer is dedicated to output from the host. The host initiates any output to the printer.
- **Local mode:** In this mode, the printer is dedicated to local copy from one or more of the displays attached to other ports on the 3708. A local screen copy is initiated by a keystroke sequence or by the IBM SNA host.
- **Shared mode:** In this mode the printer may be used both for host-initiated printing and to allow attached displays to send data to the printer.

A printer can also be attached to an auxiliary port of a display, in which case the display and the printer will appear to the host as two different logical units. This printer may be used in system, local, and shared modes. This capability allows a display and a printer to share a single 3708 port, and is a very cost effective solution when the connection to the 3708 is via a switched line.

- **Protocol Enveloping Mode:**

A printer may be attached to a 3708 port in protocol enveloping mode if the port is configured to suppress the 3708's logon screen. Seven-bit (with or without parity) or 8-bit data can be received. Port configuration is accomplished through the 3708 control terminal.

**ASCII/Asynchronous Plotter Support:**

Plotters are supported in both protocol conversion and protocol enveloping mode and must have a serial interface CCITT V.24/EIA RS-232-C.

- **Protocol Conversion Mode:**

ASCII/asynchronous plotters are supported in LU1 SCS transparent mode. 7-bit (with or without parity) or 8-bit data transfer is supported in this mode.

- **Protocol Enveloping Mode:**

Plotters and other ASCII/asynchronous devices can be attached in this mode operating with compatible IBM SNA host application software. The 3708 device port(s) must be configured for 3708 logon screen suppression and transparent data flow. In this mode 8-bit data can be transmitted transparently through the 3708 to/from the IBM SNA host.

**Personal Computer (PC) - File Transfer Support:**

PC file transfer support is provided by the IBM PC/HOST File Transfer and Terminal Emulator Program (FTTERM) which supports IBM PCs communicating with an IBM SNA host through the 3708. It gives the PC user full-screen 3270 terminal emulation and file transfer capability when operating with the 3708 in protocol conversion mode. Connection between the PC and the 3708 is through the PC's asynchronous communication adapter.

FTTERM can also emulate a 3101 terminal and attach to the 3708 in protocol enveloping mode. This connection provides access to asynchronous applications at the IBM SNA host that formerly interfaced to the Network Terminal Option (NTO) in the 37X5 Communications Controller. The PC can also operate through the 3708 to an ASCII asynchronous host attached to another port of the 3708. In addition, FTTERM, operating in native mode, can access network services.

**Control Terminal:**

The control terminal provides the operator interface for managing the 3708, providing an easy-to-use means to configure the 3708, display product and operational information, and perform problem determination. The control terminal must initially be one of the IBM pre-defined ASCII displays. Once a User-Defined Terminal (UDT) is defined for a terminal for which IBM does not provide a mapping, then the terminal defined in the UDT can also serve as the control terminal. A password must always be entered before an operator can perform control terminal functions.

A control terminal can be used to configure the 3708. Configuration data is entered from the control terminal via user-friendly screens. The control terminal can be attached either directly or remotely on any downstream port capable of operating in protocol conversion mode. The remote connection can be either switched or non-switched. The 3708 configuration data can be displayed at any time by request from the control terminal operator.

The control terminal can be used to display vital product data, such as the repair ID number and EC level. It can also be used as a data and control lead monitor for a downstream port. This allows the control terminal to display data entering and leaving a particular downstream port. It can also be used to display the response time counters for each logical unit. The control terminal operator can use the 3708's local print capability to obtain a copy of the screens displaying the desired information.

The control terminal can also be used for problem determination. The seven most recent alerts will be logged by the 3708 and will contain a probable cause indication, the recommended action(s), and a failure code. The control terminal operator can perform problem determination by displaying these alerts and referring to the "Problem Determination" manual for detailed information about the alert and suggested corrective action. The control terminal functions can also be used by a remote IBM service specialist for microcode display, analysis, or alteration. This service is available to those customers having an IBM maintenance agreement on their 3708.

## Pluggable Cartridge with Central Site Configuration:

The 3708 Pluggable Cartridge with Central Site Configuration enables the centralized management of 3708 configuration information and microcode changes. A data base for the storage of 3708 configurations, retrieval and loading of configuration information from/to IBM 3708s, and replication and modification of 3708 configuration information is supported.

Retrieval of configuration information from a 3708 is through a downstream port. Loading of new configuration information to a 3708 can be done through a downstream port or through the SNA host link using NetView or NCCF. Attachment to the downstream port may be switched or non-switched (leased line or direct attach).

Configuration information includes port, host and device definition. User-Defined Terminal (UDT) definition, and user-defined Translate Table definition.

Menu-driven, user-friendly screens with field-specific help facilities reduce the likelihood of errors during the configuration process. The 3708 central site configuration aid checks all configuration information as it is entered and warns the user of potential errors.

Microcode changes that have been applied to a 3708 may be retrieved via a downstream port and saved by the central site configuration aide. The microcode changes may then be distributed to other IBM 3708s in the network via a downstream port or sent to the SNA host system for downloading on the host link with NCCF or NetView.

The Pluggable Cartridge with Central Site Configuration includes all of the function of the Pluggable Cartridge.

## MAINTENANCE

**Maintenance Planning:** The 3708 is designed to be supported from a control terminal and from an SNA host using the network management products NPDA and NLDM, as well as via the dial-in support offered through the IBM Remote Support Center. IBM remote service can be provided if the Remote Support Center is given access to the customer controlled password for the control terminal. In order for IBM to assist in problem isolation, the customer must provide the 3708 with access to the public switched network and furnish a (Canada only > 212A <) (Except Canada > V.22 <) compatible stand-alone asynchronous modem with auto-answer such as the IBM 5841. This assistance is available for 3708s covered under warranty or IBM maintenance agreements.

**Maintenance Service:** A brief summary of available service offerings for the 3708 is shown below:

### Countries with Repair Center Capability

- **IBM On-Site Exchange (#9830):** IBM is responsible to deliver to the customer's site a functionally equivalent machine element in good working order and to replace the failing element with this exchange element. IBM will setup and test the exchange element and will remove the failing element from the customer's premises. Coverage will represent normal IBM shift coverage only, with additional coverage available as options to the basic coverage. This service allows the customer to call an IBM CE service number for assistance after the customer has attempted CPAR and is unsuccessful.
- **Customer On-Site Exchange (#9824):** IBM is responsible to deliver to the customer's site, a functionally equivalent machine element in good working order. The customer is responsible to disconnect the failing element, connect the exchange element and return the failing element to IBM, in accordance with IBM's instructions. IBM is responsible for both outbound and inbound shipping charges. This service allows the customer to call an IBM CE service number for assistance after the customer has attempted CPAR and is unsuccessful.
- **Customer Carry-In Exchange (#9816):** The customer is responsible to deliver the failing machine element to a designated IBM Service/Exchange Center. IBM will exchange a

functionally equivalent element in good working order for the failing element. The customer may instead package and ship, prepaid, the failing element to the designated IBM Service/Exchange Center. IBM will exchange and return ship the element, prepaid, to the originating customer location. This service allows the customer to call an IBM CE service number for assistance after the customer has attempted CPAR and is unsuccessful.

- **Customer Carry-In Repair (#9821):** The customer is responsible to deliver the failing machine element to a designated IBM Service/Exchange Center. IBM will repair the element and notify the customer as soon as it is ready for pick-up. The customer may instead package and ship, prepaid, the failing element to a designated IBM Service/Exchange Center. IBM will repair and return ship the element, prepaid, to the originating customer location. This service allows the customer to call an IBM CE Service number for assistance after the customer has attempted CPAR and is unsuccessful.
- **IBM Hourly Service:** IBM Hourly Service requires the same procedure be followed as the Customer Carry-In Repair offering. The customer is charged for repair labor, replacement of maintenance parts and all handling and shipping costs. Upon request, IBM will provide, for a charge, an estimate of repair charges. IBM Hourly Service does not provide Product Support Center access.

### Countries without Repair Center Capability

- **IBM On-Site Repair (#9798):** IBM is responsible to come to the customer's site, repair and test the failing machine element. Coverage will represent normal IBM shift coverage only, with additional coverage available as options to the basic coverage.

**Warranty:** (Countries with repair center capability > The 3708 is covered under a one (1) year warranty. The specific service provided for this warranty is Customer On-Site Exchange. For an additional charge the warranty service can be upgraded to IBM On-Site Exchange Warranty Option. Optional periods of maintenance are available for the 3708. See "Service Plan" section for details. <)

(Countries without repair center capability > The 3708 is covered under a one (1) year warranty. The specific service provided for this warranty is IBM On-Site Repair coverage. <)

## SPECIFY

- **Voltage:** (Canada only > 120V, 60 Hz, no specify code required. <) (Except Canada > No specify code required. High voltage and appropriate power cord will automatically default on the 3-digit country code.

Specify codes for low voltage machine may be entered. Appropriate power cords will be automatically shipped with low voltage machines.

#2804 - Low Voltage <)

- **Power Cable:** The power cables will be shipped with the appropriate country wall plug dependent upon the country code. No specify code is required for proper default cord. In countries where low voltage machines are specified, a 4.3m (14 ft) low voltage power cord is automatically shipped.
- **Power Cords:** The following power cord part numbers are for High Voltage machines in the countries shown:
  - 6952293: Argentina, Brazil
  - 1838577: Korea, Taiwan, Venezuela, Japan, Ecuador, Philippines
  - 6952313: Australia, New Zealand
  - 6952376: Chile
  - 6952358: Malaysia, Singapore
  - 6952349: Hong Kong
  - 6952322: Indonesia
  - 7842127: Mexico

The following power cord part number is for Low Voltage machines in all countries: 6952302.

- Nomenclature: The nomenclature codes will automatically default on the 3-digit country number. If other than standard is required then specify as follows:

#2935 - Canadian French

## SPECIAL FEATURES (NONE)

## ACCESSORIES

Accessories are ordered specifying the following part numbers. The 3708 has ten ports with CCITT V.24/RS-232-C 25-pin female connectors.

All external cables for the 3708 must be ordered separately and are chargeable items. Allow a lead time of at least two weeks for fixed length cables and four weeks for variable length cables.

**Standard Length Cables:** The following communication cables must be ordered by part number. CCITT V.24/RS-232-C cables can be ordered in three standard lengths. All cables are equipped with 25-pin connectors. DCE cables are equipped with male connectors on both ends. There are two types of DTE cables:

1. Three (M-to-F) cables, P/Ns - 6405393, 6405394, 6405395 are for direct attached devices that are equipped with a male connector.
2. Three (M-to-M) cables, P/Ns - 6405421, 6405422, 6405423 are for direct attached devices that are equipped with a female connector, such as the 3101, 3161, and 3163.

The upstream cable from the 3708 to the IBM host(s) should always be a DCE cable.

Standard length CCITT V.24/RS-232-C cables:

P/N	Description	Length
6405390	RS-232-C External cable - DCE	10 ft, 3m
6405391	RS-232-C External cable - DCE	25 ft, 8m
6405392	RS-232-C External cable - DCE	50 ft, 15m
6405393	RS-232-C External cable - DTE	10 ft, 3m
6405394	RS-232-C External cable - DTE	25 ft, 8m
6405395	RS-232-C External cable - DTE	50 ft, 15m
6405421	RS-232-C External cable - DTE	10 ft, 3m
6405422	RS-232-C External cable - DTE	25 ft, 8m
6405423	RS-232-C External cable - DTE	50 ft, 15m

**Variable Length Cables:** CCITT V.11/RS-422-A cables can be ordered in variable lengths up to 1,219m (4,000 ft). Cables are equipped with male to male connectors. Specify part number and length when ordering. Cables lengths greater than 122m (400 ft) are equipped with lightning-induced pulse protection circuitry.

Be sure the ASCII/asynchronous device is capable of supporting this interface.

- P/N 6405396 - Variable length external cable - up to 122m, (400 ft) maximum
- P/N 6405397 - Variable length external cable - from 123m to 1,219m, (401 ft to 4,000 ft) maximum

Procurement of equivalent cables through an alternate vendor is the customer's responsibility. Cables should be shielded. See the publication "IBM 3708 Network Conversion Unit Planning and Installation" (GA27-3766) for cable descriptions and specifications.

## SUPPLIES (NONE WITH MACHINE)

**3710 NETWORK CONTROLLER****PURPOSE**

The 3710 is an advanced network product which performs concurrent ASCII/asynchronous protocol conversion to full screen (1920 character) SNA 3270, BSC 3270 protocol conversion to SNA 3270, asynchronous and BSC RJE/MLI protocol enveloping, ASCII passthrough (to an ASCII host), and concentration of asynchronous, BSC, and SNA/SDLC traffic. 3710 data may be transmitted upstream to one or more MVS or MVS/XA host sites over one or more user defined SNA/SDLC and/or X.25 communication lines.

**DESCRIPTION**

The 3710 connects upstream to either a 3705, 3720, 3725, or another 3710, and downstream to both SNA and selected non-SNA devices. Attachment of up to 60 lines (upstream plus downstream) is provided. With relation to the 3710, upstream refers to the host side and downstream refers to the terminal side of the 3710.

The upstream attachment via a X.25 link is to a 3725 with NPSI only. The 3710 is supported by enhanced IBM communication network management (CNM) functions provided by NCCF, NPDA, ACF/NCP, ACF/VTAM and SSP on the IBM host(s).

Downstream SDLC devices are supported at speeds ranging from 110 bps to 64K bps. BSC and asynchronous devices are supported at speeds ranging from 110 bps to 19.2K bps. Upstream links can run at up to 64K bps.

The Configuration Control Program function within SSP is an IBM Program that provides user friendly configuration entry and validation services for the 3710. The Configuration Control Program component of SSP provides a database which can be used to manage a 3710 network effectively. Configuration parameters within any 3710 can be dynamically altered using the this component and NCCF. It supports all communication adapters on the 3710 except for the eight (8) Port Communication Adapter, which is supported by the control terminal only.

See the specific software sales manual pages for the 3710 support functions provided by the referenced software.

3710 configuration, installation, operation and problem determination can be accomplished through the use of a user provided control terminal. The control terminal must be an IBM 3101 or equivalent. It can be attached to the 3710 either directly or remotely via a switched or non-switched communication line. Use of the control terminal on a switched line allows a single control terminal to manage multiple 3710s.

The Control Terminal must be a TTY 33/35 terminal with the following characteristics.

- Supports half-duplex
- An 80 character X 25 lines display
- Alphanumeric keyboard
- Does not require echoplex.

Remote attachment of the Control Terminal is via a customer provided 1200-bits/second, auto-answer, half-duplex, 202C/CCITT V.24 compatible, standalone modem.

The 3710 has been designed for easy installation by untrained customer personnel. It is customer set up (CSU) equipment. The 3710 is provided with extensive internal diagnostics to support both CSU and customer problem analysis and repair (CPAR).

The 3710 is composed of a single machine type number and a single model. The model is composed of five machine elements. Five special features can be ordered with the base 3710-1.

Features for the 3710 can be ordered in quantities greater than could actually be installed in a machine at one time. This allows a customer to order spare elements in order to be able to bring up a failing unit as rapidly as possible. In the case of an element failure,

the customer would pull the failing element and substitute one of his working spares. All base elements and optional features are designed for easy plugability by the customer.

Orders will not be checked by AAS for features in excess of the maximum installable at one time.

The 3710 contains one of each of the following:

- Base Frame
- Diskette Unit (5 1/4 inch "Floppy")
- Control Unit including 384K of storage
- Power Unit
- Service Adapter (Dual Port EIA RS-232-C/CCITT V.24 Adapter)

**MODELS**

**Model 1 001:** 384K storage, dual port EIA RS-232-C/CCITT V.24 service adapter, 5 1/4 inch "floppy" diskette unit.

**Prerequisites****Hardware**

The 3710 is designed to operate in a standard office environment, either directly or remotely attached to another 3710 or a 3705 or 3725 communications controller. The 3710 and its features are designed for customer setup. Microcode will be shipped on a diskette.

Configuration definition and validation support for the 3710 is provided through the Configuration Control Program on the host or through the control terminal. The 8PCA is managed only through the control terminal.

The customer is responsible for problem determination for the 3710. Customer Problem Analysis and Resolution (CPAR) should be executed by the customer. A customer provided control terminal is required in an IBM 3710 network for use by the customer in problem determination and configuration definition.

**Software**

The 3710 attaches to ACF/NCP V3 in a 3705, and to ACF/NCP V3 or V4 in a 3725 and to ACF/NCP V4 or ACF/NCP Subset in a 3720. The 3710 will communicate with ACF/VTAM V2 and V3 running under MVS/XA or MXS/370.

Other host subsystems and applications which support the 3710 are:

- NCCF - V2R1, V2R2
- NPDA - V3R1, V3R2
- NLDM - V1R2, V1R3
- NSI - R1
- ACF/SSP - V3 (5665-338 for MVS)

The 8PCA in protocol conversion mode appears as a 3274-51C/61C to IBM SNA host programs (e.g. IMS, CICS, TSO, and CMS) and 3274 application programs. The 8PCA also presents an NTO interface to an IBM SNA host and customer applications that previously required the NTO licensed program.

**HIGHLIGHTS**

- Remote Concentration

This capability provides for the concentration of data traffic from multiple communication lines and/or terminals onto one and/or multiple SDLC and/or X.25 links. Input traffic can be at different speeds and utilize selected forms of BSC and S/S protocols as well as SDLC. The 3710 upstream links can be attached either locally or remotely to a 3705, 3720 or 3725 port or to another 3710 port. Attachment to an upstream X.25 communication line is via a 3725 only. Only one level of 3710 to 3710 attachment is supported.

## ● Protocol Conversion

The 3710 supports protocol conversion of BSC 3270 data streams to SNA/SDLC 3270 appearance. The 8 Port Communication Adapter (PCA) feature of the 3710 converts data from ASCII/asynchronous devices to a full screen SNA/SDLC 3270 data stream, emulating a 3274-51C/61C control unit under configuration support A. This allows ASCII/asynchronous display, printers and keyboard/printers to appear as 327X/3287 (SNA) devices and to access SNA host application programs. ASCII/asynchronous protocol conversion support is only available to devices attached to an 8PCA, and not any other communication adapter on the 3710.

## ● Protocol Enveloping

The 3710 allows selected BSC and BSC/MLI traffic to be concentrated onto upstream SNA/SDLC or X.25 lines and transported across the network. 3780 BSC and JES BSC/RJE multileaving interface traffic is enveloped in the same fashion as would be done by a 3705, 3720 or 3725 running the remote half of NSI (TSF). Accordingly, while the host end of NSI(HSF) still must reside at the destination host, the 3710 provides the remote TSF function. The 3710 also allows the user to attach ASCII/asynchronous devices and concentrate their traffic onto a SNA/SDLC or X.25 line for communication with an IBM SNA host. The 3710's asynchronous enveloping function provides an interface to host applications similar to the Network Terminal Option (NTO) licensed program in a 3705, 3720 or 3725. TWX 33/35 compatible asynchronous devices attached to the 3710 can communicate with SNA applications without requiring that NTO be installed in the 3705, 3720 or 3725.

## ● ASCII Host Pass-through

The 8PCA feature provides the capability of attaching an ASCII/asynchronous host to the 8PCA. The host can communicate with an ASCII display on the same 8PCA in a transparent, or passthrough mode.

## ● Dynamic Network Change

The 3710 allows for the addition and deletion of 3710 downstream lines and devices via dynamic reconfiguration.

## ● Network Backup

The 3710 provides the capability to have multiple upstream links going to one or multiple 3705, 3720 or 3725 which go to one or multiple host domains. This capability allows the customer to provide network backup in case one of the upstream lines, modems, 3705s, 3720s or 3725s or hosts fails.

## ● X.25

X.25 support in the 3710 will be provided for host upstream links in addition to and/or in lieu of the SDC secondary function. Both Permanent Virtual and Switched Virtual Circuits are employed. The 3710 can not originate calls into the X.25 network. This support is available in conjunction with the 3720 or the 3725 only.

The X.25 feature for the 3710 will provide the capability to attach to data transmission services having interfaces complying with Recommendation X.25 (Geneva 1980) on the International Telegraph and Telephone Consultative Committee (CCITT). This interface support will be in conformance with the functional description contained in IBM's General Information Manual, GA27-3345, "The X.25 Interface for Attaching IBM SNA nodes to Packet-Switched Data Network".

At this time attachment to the following country networks may be announced if all the homologation/certification requirements have been completed.

- Argentina (ARPAC)
- Australia (AUSTPAC)
- Brazil (RENAPAC)
- Canada (DATAPAC)
- Korea (DACOM-NET)
- Mexico (TELEPAC)

- New Zealand (NZPO)
- Singapore (TELEPAC)
- Taiwan (PACNET)

Announcement and support of other X.25 networks will depend on network attachment availability and evaluation. Selection of X.25 networks for attachment will be based on IBM's technical and business judgment in addressing the requirements of customers. Consult your IBM representative for further information.

## ● Satellite Link Attachment

The 3710 will provide Modulo 128 support consistent with associated 3720 or 3725 support to provide the user with enhanced link utilization and end-user response time. Modulo 128 support for the 3710 is for SNA/SDLC both upstream and downstream of the 3710.

## ● Remote Assistance Support

Remote assistance is used by IBM support specialists to diagnose 3710 problems not resolved by the customer during the course of performing CPAR. This assistance is available to rental customers and those customers whose 3710s are under maintenance agreement or are still within warranty.

## ● Service Modem Attachment

Attachment of the service modem is to the public switched network ordered from the telephone company. The line should be ordered as a switched line for data communications.

## ● Equipment Description

The 3710 provides for up to a maximum of 60 ports. The maximum speed of a port can be up to 64K bps depending upon the type of communication adapter selected. The 3710 provides either internal or external clocking. The connecting lines can be either directly attached (no modems) or remotely attached via communication lines. Configuration, operation, and maintenance is performed by either a customer provided Control Terminal or associated host software, NCCF, SSP, and NPDA. (See respective software sales pages for specifics). The 3710 is a CSU (Customer Setup) and CPAR (Customer Problem Analysis and Resolution) machine. Off-line diagnostics require a Control Terminal.

## ● Attachment Support

The following upstream interfaces are supported by the 3710 employing SNA/SDLC and/or X.25 protocols.

- (Canada only) > EIA RS-232-C/CCITT V.24 - Local or Non-Switched to 19.2K bps
- CCITT V.35 - DDS - Local to 64K bps or Non-Switched to 56K bps
- CCITT X.21 - Local to 64K bps or Non-Switched to 48K bps <)
- (Except Canada) > EIA RS-232-C/CCITT V.24 - Local or Non-Switched to 19.2K bps.
- CCITT V.35 - DDS - Local or Non-Switched to 64K bps.
- CCITT X.21 - Local to 64K bps or Non-Switched to 48K bps (not Short Hold Mode). <)

The following downstream devices are supported by the 3710:

- Teletypewriter Exchange Service (TWX 33/35) terminals - Local, switched, or non-switched, point-to-point. The TWX 33/35 interface is as defined in the Bell System Technical Reference PUB #41713, dated August 1971, titled "Model 33,35 and 37 Stations for point-to-point Private Line Service".
- 3101 in TWX 33/35 compatibility mode - Local, switched, or non-switched, point-to-point.
- IBM Personal Computers in TWX 33/35 mode - Local, switched, or non-switched, point-to-point.
- 3780 BSC Protocol Interface or equivalent - Local, non-switched, switched, point to point. (User responsible for validating interface equivalency).

- BSC/RJE Multi-Leaving interface or equivalent - Local, non-switched, switched, point-to-point. (User responsible for validating interface equivalency).
- 3274 BSC - multipoint, Local or non-switched point to point with multipoint line control.
- 3276 BSC - multipoint, Local or non-switched point-to-point with multipoint line control.
- 3271 BSC - multipoint, Local or non-switched point-to-point with multipoint line control.
- SNA PU2 - non-switched, Local, point-to-point, including another 3710. Non-Switched, multipoint including another 3710.

## ● 8 Port Communication Adapter (8PCA)

The 8PCA provides a total of eight ports per feature for ASCII host and ASCII/asynchronous terminal attachment. For example, if one port is used for attachment to an ASCII host, then seven ports are available for ASCII/asynchronous terminal attachment. If two ports are used for ASCII host attachment, then six ports remain for ASCII/asynchronous terminal attachment.

### Attachment to an IBM SNA Host

Each ASCII/asynchronous device communicating with an IBM SNA host through the 8 PCA can operate in one of two modes.

#### Protocol Conversion Mode

The 8PCA is a protocol converter that allows ASCII/asynchronous devices, such as display terminals, printers, keyboard/printers and personal computers to appear to an IBM SNA host as a 3270 display or printer. The 8 PCA converts the 3270 data stream to and from ASCII to permit ASCII devices access to 3270 application programs on the host system. ASCII/asynchronous plotters can also be attached in this mode. The plotter appears the same to the host as a 3287 printer.

The 8PCA in protocol conversion mode allows a display with an attached printer to share an 8PCA port and appear to the host as two logical units. A user may communicate with the host processor from the display and have output sent to the printer over a single connection. This feature of the 8PCA permits a remote user to realize a significant cost savings by having both display and printer capability on only one communication line.

#### Protocol Enveloping Mode

The 8PCA provides a protocol enveloping function, allowing TWX 33/35 compatible displays and keyboard/printers to communicate over an SNA/SDLC line attached to an IBM SNA Host system through a 37X5 with NCP. The terminal appears to the host application the same as would a TWX 33/35 terminal connected through the Network Terminal Option (NTO) licensed program. For TWX compatible devices, the NTO function resides in the 3710 so that NTO does not need to be installed in the 37X5. Protocol enveloping mode can also be used to allow plotters and other ASCII/asynchronous devices to receive and transmit 8-bit transparent (256 character codes, or binary) data.

The 3710 may be attached to up to five IBM SNA Host processors. Each 8PCA is supported as a separate physical unit (PU). This means that there is one NCP poll for all devices attached to a 8PCA. Multiple connection means that a device can selectively attach to one of five different IBM SNA hosts, or select one of multiple (up to five) links to the same IBM SNA Host. Selection is made from the user's terminal at log on time.

The 8PCA will use NPDA's V3R1/V3R2 non-product specific alerts support facility. Alerts from the 8PCA will appear in standard Management Vector Transport (NMVT) format. When the 8PCA is connected to more than one IBM SNA host, it will send alerts to the host which owns the resource for which the alert is being sent. Alerts concerning resources not owned by any IBM SNA host will go to all hosts.

When an ASCII device and ASCII host are connected through the 8PCA (operating in passthrough mode), central site problem determination will be enhanced because alerts for these resources will be sent to NPDA (to one or more IBM SNA Hosts), even though the

resource does not belong to an SNA host. Alerts are also logged for display at the control terminal.

The 8PCA will perform a Response Time Monitor (RTM) function similar to that of the 3274 interacting with the current release of NLDM V1R2/V1R3. RTM calculates the response time for each transmission and summarizes the result for each ASCII device being monitored. The 8PCA will maintain five counters associated with each logical unit and track the number of transactions which fall in specified time ranges. The RTM function applies only to displays operating in Protocol Conversion mode.

### Attachment to an ASCII Host Processor

The 8PCA may be attached to one or more ASCII hosts. When connecting an asynchronous ASCII terminal to an ASCII host via the 8PCA, the 8PCA is transparent to both the terminal and the host. This connection is called passthrough. The terminal user selects an ASCII host at logon time via a menu. If the ASCII host is available, connection will be established. Communication between the ASCII display and the ASCII host through the 8PCA is always point-to-point. The line speeds and protocols of the ASCII display and the ASCII host must be the same, and the connection between the 8PCA and the ASCII Host must be direct or non-switched. Only one ASCII display can communicate on the same link with an ASCII host at one time. Error checking is the responsibility of the ASCII host.

### ASCII Display Support

ASCII/asynchronous devices may be attached directly up to 1219m (4000 ft) or remotely via switched or non-switched lines.

#### Mode Selection

Via a menu at logon time, a user may select one of the following: one of up to five SNA/SDLC links to the same or different IBM SNA hosts, or one of multiple links to an ASCII host or hosts. An 8PCA port may be pre-configured to allow an ASCII/asynchronous display to operate in protocol conversion mode, protocol enveloping mode, or be allowed to have the mode be dynamically selectable by the BIND from the IBM SNA host application.

#### Protocol Conversion Mode

In protocol conversion mode an ASCII display terminal operating in character mode attached to the 8PCA is treated as one of the following IBM display units with a 1920 character screen (24 rows X 80 columns):

- 3278 Model 2
- 3279 Model 2A (in either monochrome or four color support)
- 3178
- 3179 (in either monochrome or four color support).

**Note:** For simplicity, all future references will state the 3178 as the emulated device. The 8PCA provides the necessary data stream conversion and translation from/to EBCDIC/ASCII that allows the user of an ASCII display most of the full screen formatting and keyboard functions of a 3178 display unit. Certain functions 3270 keys and functions are not supported. They are:

- ALT Cursor
- APL/TEXT
- ASCII option
- Attribute select keys
- Clicker on/off
- Compression of symbol definition bit strings
- Encrypt/decrypt
- Extended data streams
- Host load of printer authorization matrix
- IBM 3274 log/test facility
- Katakana
- Light-pen
- Magnetic readers
- Mono/dual case control of IBM 3278 Printer
- More than four-color support
- Programmed symbols
- Screen sizes larger than 1920 characters
- SFAP options

- Shift override of numeric lock
- SI print order
- Test request read
- User-defined alerts

The following specific ASCII displays are supported by the 8-Port Communication Adapter Feature for Protocol Conversion - switched or non-switched, point-to-point:

- 3101 Models 10, 12, 13, 20, 22 and 23
- 3161 ASCII Display Station (in native mode)
- 3163 ASCII Display Station (supported as a 3161)
- IBM PC in 3101 mode with 3101 standard keyboard functions
- ROLM - CYPRESS, CEDAR and JUNIPER (via ROLM CBX)
- DEC (Digital Equipment Corporation) VT52, VT100, and VT220
- Hewlett Packard 2621B
- Data General - D210
- Hazeltine Model 1500, Esprit I and II
- Televideo 910, 912C, and 950
- Lear Siegler models ADM 3A, ADM 24E, ADM 31
- ADDS - Viewpoint and Viewpoint 78
- Teletype - models 5410 and 5420
- Northern Telecom Displayphone
- Beehive ATL-078

The list of displays contains several trademarks and registered trademarks:

- Viewpoint is a registered trademark of Applied Digital Data Systems.
- Dasher is a registered trademark of the Data General Corporation.
- DEC is a registered trademark of the Digital Equipment Corporation.
- ESPRIT I and ESPRIT II are trademarks of Esprit Systems, Inc.
- DUMB Terminal (Lear Siegler - model ADM 3A) is a registered trademark of Lear Siegler, Inc.
- DISPLAYPHONE is a trademark of Northern Telecom, Inc.
- ROLM is a registered trademark and Cypress, Cedar, and Juniper are trademarks of the ROLMM Corporation.
- TELEVIDEO is a registered trademark of Televideo Systems, Inc.
- BEEHIVE is a registered trademark of Beehive International.
- HEWLETT PACKARD is a registered trademark of Hewlett Packard.
- TELETYPE is a registered trademark of Teletype Corporation.

In addition to the supported displays listed above, other OEM ASCII displays may be attached using the 3710 8PCA feature called "User Defined Terminals" (UDTs). Up to 15 different tables that can support other OEM ASCII display types not listed above may be configured by the control terminal operator to attach to a 3710 8PCA at any one time. The ASCII display must be capable of operating in character mode and support the ANSI X3.4 1977 (ASCII) character set and must be supported by one of the four screen addressing classes as defined in the 3710 Planning Manual.

The 8PCA uses a standard EBCDIC/ASCII translate table as defined in ANSI 3.4, 1977 (ASCII). One additional user defined table may be configured by the control terminal operator.

Highlighting and four color support in the 3270 data stream is supported if the ASCII device supports these features. Light-Pen application compatibility may be simulated using the Cursor Select Key. Light-Pens are not supported. The 3710 8PCA emulates the status line of the 3278 display. The status line is displayed on the 25th line if the ASCII display supports an addressable 25th line. Otherwise, the status line can be switched on/off by the user on the 24th line of the screen with a keystroke sequence.

Any graphics display which can be supported for input as one of the IBM or user defined ASCII/asynchronous displays can receive 8-bit transparent (binary) data from the host in protocol conversion mode.

Two features are provided in the 8PCA to enhance productivity. They are type-ahead key queuing and enhanced null/blank processing. Type-ahead key queuing provides the user with the capability of entering keystroke sequences without waiting for a completion of a screen write. This is a very productive feature when

an ASCII display or personal computer is attached through a low speed switched connection. Enhanced null/blank processing allows the user to use either the space bar (blank character) or the cursor move keys (null) to edit and separate fields. When the enter key is depressed the 8PCA will convert imbedded nulls to blanks. Therefore, the data sent to the host contains blanks wherever there was either a blank or null on the screen, and the format reflects the screen positioning of the data that the user saw displayed. Both of these functions are selectable by the control terminal operator.

### Protocol Enveloping Mode

In protocol enveloping mode, ASCII displays communicate as LU1, TWX 33/35 devices (NTO emulation). Communication is line by line. 8-bit transparent (256 character codes, or binary) data transfer is supported in this mode.

### ASCII Keyboard/Printer Support

#### Protocol Conversion Mode

In this mode, the keyboard/printer is supported as a printer only. The following keyboard/printer input functions are supported:

- Cancel Print, in LU1 SNA Character String (SCS) mode
- PA1 (Program Attention), in LU1 SCS mode
- PA2 in LU1 SCS mode
- Enable Print/Hold Print (LU1 SCS mode and LU3 Data Stream Capability - DSC - mode).

A single keyboard map will be generic for all keyboard/printers for the PA1, PA2, Hold Print/Enable Print, and Cancel Print functions.

### Protocol Enveloping Mode

In protocol enveloping mode, ASCII keyboard/printers communicate as LU1, TWX 33/35 devices (NTO emulation). Communication is line by line. 8-bit (256 character codes, or binary) data transfer can be supported in this mode.

### ASCII Printer Support

#### Protocol Conversion Mode

ASCII printers are supported as a 3287 Model 1 or 2. Printers are supported as LU1 (SCS mode) and/or LU3 (DSC mode). Buffered and un-buffered printers are supported.

The following printer characteristics determine which ASCII printers may be supported by the 8PCA. If an ASCII printer has these characteristics it is supported by the 8PCA.

- Asynchronous duplex communication
- Line speeds 110 to 19.2K bps
- Serial interface CCITT V.24
- ANSI X3.4, 1977 (ASCII) character set
- Maximum line length of 132 characters
- Carriage return does not generate a line-feed
- Line-feed does not generate a carriage return
- Delete characters (X '7F') are ignored
- DC1/DC3 are used for XON/XOFF pacing
- Uses 7-bit data with or without parity and 8-bit data without parity in LU1 SCS mode.

Protocol conversion provides printer support in three modes:

- System mode: In this mode, the printer is dedicated to output from the host. The host initiates any output to the printer.
- Local mode: In this mode, the printer is dedicated to local copy from one or more displays attached to other ports on the 8PCA. A local screen copy is initiated by a keystroke sequence or by the IBM SNA host.
- Shared mode: In this mode the printer may be used both for host initiated printing and to allow attached displays to send data to the printer.

A printer can also be attached to an auxiliary port of a display in which case the display will appear to the host as two different logical units. This printer may be used in system, local, and shared modes. This capability allows a display and a printer to share a

single 8PCA port, and is a very cost effective solution when the connection to the 8PCA is via a switched line.

#### Protocol Enveloping Mode

A printer may be attached to an 8PCA port in protocol enveloping mode if the port is configured to suppress logon screens. 7-bit (with or without parity) or 8-bit data can be received. Port configuration is accomplished through the 3710 control terminal.

#### ASCII/Asynchronous Plotter Support

Plotters are supported in both protocol conversion and protocol enveloping modes and must have a serial interface CCITT V.24.

#### Protocol Conversion Mode

ASCII/asynchronous plotters are supported in protocol conversion mode as a 3287 printer. 7-bit (with or without parity) or 8-bit data transfer in LU1 SCS transparent mode is supported.

#### Protocol Enveloping Mode

Plotters and other ASCII/asynchronous devices can attach in this mode operating with compatible IBM SNA host application software. The 8PCA device port(s) must be configured for logon screen suppression and transparent data flow. In this mode 8-bit data can be transmitted transparently through the 8PCA and the 3710 to/from the IBM SNA host.

#### Personal Computer (PC) - File Transfer Support

PC file transfer support is the means by which data can be transferred between the disk/diskette on a PC attached to the 8PCA and either an IBM or an ASCII host. This file transfer support is in the form of complementary programs, one in the host and one in the PC, which provide file transfer support in the specific hardware and software environment.

A customer wishing to carry out PC file transfer through the 8PCA must write or acquire a pair of programs for the host and the PC which can provide the required functions in his environment. The 3710 Planning Manual provides the information which the customer will need in implementing PC file transfer through the 8PCA. File transfer may be implemented in all modes of 8PCA operation - protocol conversion, protocol enveloping, and ASCII/asynchronous passthrough.

#### Control Terminal

The Control terminal provides the operator interface for managing the 8PCA, providing an easy-to-use means to configure the 8PCA ports, display products, and operational information, and perform problem determination. The control for the 8PCA must meet the same requirements as the 3710 control terminal. A password must always be entered before an operator can perform control terminal functions.

The control terminal is used to configure the 8PCA(s). Configuration data is entered from the control terminal via user friendly screens. The control terminal may be attached either directly or remotely on any of the 3710's ports except for the 8PCA ports. The remote connection may be either switched or non-switched. The 8PCA configuration data can be displayed at any time by request from the control terminal operator.

The control terminal can be used to display vital product data, such as the repair ID number and EC level. It can also be used as a data and control lead monitor for a downstream port. This allows the control terminal to display data entering and leaving a particular downstream port. It can also be used to display response time counters for each logical unit. The control terminal operator may use the 8PCA's local print capability to obtain a copy of the screens displaying the desired information.

The control terminal may also be used for problem determination. The twelve most recent alerts will be logged by the 3710 and will contain a probable cause indication, the recommended action(s), and a failure code. The control terminal operator may perform problem determination by displaying these alerts and referring to

the Control Terminal Guide for detailed information about the alert and suggested corrective action. The control terminal functions may also be used by a remote IBM service specialist for microcode display, analysis, or alteration. This service is available to those customers having an IBM maintenance agreement on their 3710.

#### Security

User access to the 8PCA can be controlled by requiring users to enter a password in order to gain access to a port. Passwords are assigned from the control terminal, and can be different for each port. The 8PCA can optionally be configured without port passwords so that IBM host application passwords are all that is necessary to logon.

SNA session security is supported. When a ASCII device is in session with an IBM SNA host and either disconnects or exceeds the configurable inactivity timer the 3710 will terminate the session. Another device is NOT allowed to dial into a port and gain access to a SNA session which was previously defined, but not yet terminated. Session disconnect from the IBM SNA host is also supported. If the IBM SNA host subsystem or application supports the NOTIFY command, the 8PCA provides power on/off notify whenever the terminal connects/disconnects or is timed out by the 8PCA due to inactivity.

The 8PCA cannot provide security for host subsystems or applications (such as IMS) which retain data when the session is terminated (i.e., by anything other than an application or user logoff) in the expectation that when the same logical unit comes into session again, it will be the same terminal and user. For example, IMS maintains the conversation even though the session with a workstation was terminated. Subsequent access to the same port of the 8PCA by a different workstation would allow a new user access to the data queue established during the previous session.

#### Operating Environment

The 3710 is fully compatible with SNA. The 3710 allows attachment of non-SNA devices to a SNA network and takes advantage of SNA CNM functions.

#### Device Attachment

The display terminals mentioned in this document are products of the following companies that have been tested at the level defined by the following documentation:

- "IBM 3101 Display Terminal Description", GA18-2033-1, dated May 1980 (Second edition).
- "IBM Personal Computer, IBM 3101 Emulation Program", 6936712, dated November 1982 (first edition) and "IBM Technical Reference - Personal Computer XT", 1502237, dated April 1983 (Revised Edition).
- "IBM 3161, 3163 ASCII Display Stations".
- "Lear Siegler ADM 3A - ADM 3A Dumb Terminal Video Display Unit User's Reference Manual", by Lear Siegler, Inc. (document #DP2190683F), dated June 1983 edition.
- "Lear Siegler ADM24E - Addendum to ADM Video Display Terminal User's Reference Manual" by Lear Siegler, Inc. (document #DP2241083P) dated October 1983.
- "Lear Siegler ADM31 - ADM31, IT, Intermediate Terminal Video Display Unit, User's Reference Manual" by Lear Siegler, Inc. (document #DP2111083F) dated October 1983.
- "VT52, VT100 - User Guide VT100", by Digital Equipment Corporation, dated June 1981 (third edition), Catalog #EK-VT100-UG-003.
- "VT220 - VT220 Owner's Manual", by Digital Equipment Corporation, dated Sept 1983 (first edition), Catalog #EK-VT220-UG-001.
- "Televideo 910 - Televideo Model 910 CRT Terminal Installation and User's Guide", by Televideo Systems, Inc. (document #B2002500 Revision D), dated April 1983.

- "Televideo 912C - Televideo Operator's Manual", Models 912/920 by Televideo Systems, Inc. (document #B300001-001), dated 1979.
- "Televideo 950 - Televideo Model 950 CRT Terminal Installation and User's Guide", by Televideo Systems, Inc. (document #B300002-001 Revision B), dated April 1982 edition.
- "ADDS Viewpoint - ADDS Viewpoint User's Manual", by Applied Digital Data Systems, Inc., pub. #518-30000, dated January 19, 1981, revised May 1981.
- "ADDS Viewpoint/78 - ADDS Viewpoint/78 User's Manual", by Applied Digital Data Systems, Inc., Pub #518-32700, dated April, 1983.
- "Hazeltine 1500 - Hazeltine 1500 Video Display Terminal Reference Manual", by Hazeltine Corporation, dated July 1977 edition (document #HI-1056A).
- "ESPRIT I - ESPRIT I Video Display Terminal Reference Manual", by Hazeltine Corporation, dated June 1983 edition (document #HI-1094 Revision B).
- "ESPRIT II - Hazeltine ESPRIT II Video Display Terminal Reference Manual", by Hazeltine Corporation, dated September 1982 edition (document #HI-1109 Revision A).
- "Teletype 5410 - 5410 Asynchronous Display Terminal User's Guide", by AT&T Teletype Corporation, Manual 605 Issue 2, dated May 1984.
- "Teletype 5420 - 5420 Buffered Display General Technical Reference", by AT&T Teletype Corporation, dated March 1984 edition, (document #SD5420-401).
- "Beehive ATL-078 - ATL-078 Technical User's Manual", (document # TM0184-0006-1), April 1984 (Revised 7/84, Version 1.1 by BEEHIVE International).
- "Northern Telecom Displayphone - Displayphone Telephone and Data Terminal Reference Manual", by Northern Telecom, (publication #P5849), Revision A, dated February 1984 (firmware release AA07) and "Displayphone Telephone and Data Terminal User Guide", by Northern Telecom, (publication #P5840), Revision F, 1983.
- "Cypress Displayphone - Cypress Keycode Generation", by Rolm OSD Austin, dated October 11, 1983.
- "Rolm Cedar and Juniper - Cedar and Juniper Terminal Reference Manual", by ROLM Corporation, dated, August 1984.
- "Hewlett Packard 2621B - Hewlett-Packard Interactive Terminal 2621B Owner's Manual", by Hewlett-Packard Company, (document #02620-90062U1282), Revision 1, dated December 1982.
- "Data General D210 - Dasher D210/211 Display Terminal User's Manual", by Data General Corporation, (document #014-000746-01), Revision 1, dated February 1984.

## Attachment Interfaces

### IBM SNA Host Attachment

The IBM systems to which the 3710 can attach include the 3090, 308X, 303X, 4341, and 4381 operating with a 3705, 3720 or 3725 Communication Controller. The 3710 can also attach to another 3710 Network Controller.

The 3710 can be attached to the IBM host either directly or remotely via a nonswitched communication link. Communication (bisynchronous at 19.2K bps) is half-duplex on either half duplex or duplex communication facilities. Communication (SDLC adapter at 64K bps or Start/Stop at up to 19.2K bps) can be either half- or full-duplex. Connection is via V.35, X.21 or X.25, or V.24.

Data rates up to 64K bps concurrently on each upstream link to the IBM SNA host(s) are supported where facilities and support are available. NRZ1 and NRZ are supported. See the M2700 sales pages for supported facilities.

## 3710 Network Controller

The 8PCA may be attached to a 5841 modem, which may be used on the asynchronous links at speeds up to 1200 bps. The IBM 1200 bps internal modem may be used with the IBM Personal Computers attached to a 8PCA. All of these modems are attached via the CCITT V.24 interface.

### ASCII Host Attachment

The 8PCA can be attached to one or more ASCII hosts. Attachment can be direct connection or via a non-switched point-to-point communication link. Data rates of up to 19.2K bps are supported. Connection is via CCITT V.24 interface. CCITT V.11 is not supported.

Duplex communication facilities are required. Clocking is internal only.

### ASCII/Asynchronous Device Attachment

Attachment characteristics of ASCII/asynchronous devices may be either direct or point-to-point non-switched or switched. Auto answer/auto disconnect are supported Data rates from 110 to 19.2K bps are supported. Auto-baud recognition (auto-baud/auto-parity) is provided for devices on switched lines at speeds up to and including 4.8K bps. Interface supported are:

CCITT V.24 up to 15m or V.11 signalling levels up to 1219m. The CCITT V.11 signalling level is designed to operated with the 3101, 3161 and 3163 ASCII/asynchronous displays. TP attachment is via non-switched or switched lines requires an asynchronous external modem with CCITT V.24 interface. Clocking is internal only.

### Modem Attachment

The 8PCA can attach to an external IBM modem or PTT mandatory modem supplied with CCITT recommendation V.24, V.28, ISO standard 2110 and other relevant CCITT recommendations. Attachment of non-IBM modems of other DCEs is subject to provisions of the "Multiple Supplier System Bulletin."

Attachment of the ROLM terminals, CYPRESS, CEDAR, and JUNIPER is via the ROLM CBX II. Connection of the 8PCA to the ROLM CBX II is through a ROLM DATACOM module (DCM) or through a ROLM Data Terminal Interface (DTI).

The 8PCA plugs into the 3710 using two-line adapter slots.

## Planning Information

### Installation and Configuration Support

The 3710 and the 8PCA are designed to be set up by the customer. During the Customer Setup (CSU) process the customer verifies, using the internal diagnostics, that the 8PCA hardware is operational. The customer must then configure the 8PCA to allow host/device attachment. The control terminal operator, using the completed configuration forms, enters the configuration data into the 3710. The configuration data reside on the diskette storage in the 3710 and are retained should a power failure occur. The 3710 comes pre-configured to allow the control terminal access.

### Maintenance Planning

The 8PCA is designed to be supported from a control terminal and from an SNA host using the network management products NPDA and NLDM, as well as via dial-in remote service. Remote service can be provided during the times that IBM is given access to the customer controlled password. In order for IBM to assist in problem isolation, the customer must provide his 3710 service adapter with dial access to the public switched network. This assistance is available for 3710s covered under warranty of IBM maintenance agreements, and for rental 3710s. Refer to Charges, Terms and Conditions for details.

**Customer Responsibilities:** Each customer should order the updated "3710 Network Controller Introduction", GA27-3430, and the updated "3710 Network Controller Planning Manual", GA27-3431-0 unless already acquired for set-up and planning work. These manuals will be updated for the 8PCA prior to General Availability of the 8PCA.

The customer is responsible for:

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## MACHINES

- Adequate site preparation
- Procurement of all communication cables for IBM host, ASCII host and ASCII/asynchronous device attachment.
- Receipt at customer's receiving dock, unpacking and placement of unit
- Setup of unit, connection of cables to communications lines, modems and processors
- Setup of the modems and attached devices
- Configuring and initialization of the 3710 8PCA
- Procurement of cables for non-IBM products
- Verifying that any OEM equipment operating with the 3710 8PCA meets customer criteria
- Price quotations, installation and cost of common carrier equipment and service
- Determining the required number of spares
- Ordering and installing a public switched network circuit for attachment to the service adapter for Warranty/Maintenance Agreement.
- If a customer has obtained a 3710 prior to General Availability of the 8PCA, a notice describing the microcode diskette EC update supporting the 8PCA will be sent to the customer, requiring his response to obtain this EC.
- Performing Customer Problem Analysis and Resolution.

Customer must provide a 1200 bps, auto-answer, half-duplex, 202-C/CCITT V.24 compatible, standalone modem for remote IBM assistance.

A Control Terminal is required for IBM On-Site Repair.

**Spares:** The customer should evaluate the number of spare components which may be required to meet the operational requirements of each customer site. The number of spare (8PCAs) for the 3710, as well as spare DCEs for the attached circuits will be dependent upon the number of units per site the customer has installed, the operational requirements, physical locations and layouts. In addition, the customer should consider such items as response time-of-service personnel (user or IBM), proximity to support organizations and the possibility that any impact on the upstream components will affect all downstream users equally. In all cases, the customer should test spares for correct operation before placing them on the shelf.

See M2700 sales pages for communications facilities. See "IBM Network Controller Planning", GA27-3431-0, for complete customer responsibilities.

### Performance Considerations

The 3710 is supported under HONE. HONE provides a Performance Analyzer which allows the user to estimate response time, line utilization, 3710 processor utilization and to determine the amount of storage required by the 3710. The HONE Configurator/Analysis number is CF3710. Additionally a manual performance analyzer is provided in the "3710 Planning Guide", GA27-3431. CF3710 will be updated to support the 8PCA Fourth Quarter, 1985. An update to the 3710 Planning Guide will be available four weeks prior to General Availability.

**Warranty:** (Countries with repair center capability) The 3710 is covered under a one (1) year warranty. The specific service provided for this warranty is Customer On-Site Exchange. For an additional charge the warranty service can be upgraded to IBM On-Site Exchange Warranty Option. Optional periods of maintenance are available for the 3710. See service plan section for details. < )

(Countries without repair center capability) The 3710 is covered under a one (1) year warranty. The specific service provided for this warranty is Customer On-Site Exchange. For an additional charge

the warranty service can be upgraded to Extended Shift Coverage. See service plan section for details. < )

**Security, Auditability, and Control:** The 3710 utilizes the security and auditability features of the host hardware and software. User management is responsible for evaluation, selection and implementation of these features, for administrative procedures, and for appropriate controls in application systems.

If sensitive data is sent over external communication facilities, user management may wish to pursue the application of cryptography.

**Note:** Cryptography must be performed external to the 3710.

**Maintenance Service:** A brief summary of available service offerings for the 3710 is shown below.

(Countries with repair center capability) > IBM On-Site Exchange

IBM is responsible to deliver to the customer's site a functionally equivalent machine element in good working order and to replace the failing element with this exchange element. IBM will set up and test the exchange element and will remove the failing element from the customer's premises. Coverage will represent normal IBM shift coverage only, with additional coverage available as options to the basic coverage. This service allows the customer to call IBM Customer Engineering for assistance after the customer has attempted CPAR and is unsuccessful.

### Customer On-Site Exchange

IBM is responsible to deliver to the customer's site, a functionally equivalent machine element in good working order. The customer is responsible to disconnect the failing element, connect the exchange element and return the failing element to IBM, in accordance with IBM's instructions. IBM is responsible for both outbound and inbound shipping charges. This service allows the customer to call IBM Customer Engineering for assistance after the customer has attempted CPAR and is unsuccessful.

### Customer Carry-In Exchange

The customer is responsible to deliver the failing machine element to a designated IBM Service/Exchange Center. IBM will exchange functionally equivalent element in good working order for the failing element. The customer may instead package and ship, prepaid, the failing element to a designated IBM Service/Exchange Center. IBM will repair an return ship the element, prepaid, to the originating customer location. The service allows the customer to call IBM Customer Engineering for assistance after the customer has attempted CPAR and is unsuccessful.

### Customer Carry-In Repair

The customer is responsible to deliver the failing machine element to a designated IBM Service/Exchange Center. IBM will repair the unit and notify the customer as soon as it is ready for pick-up. The customer may instead package and ship, prepaid, the failing element to the designated IBM Service/Exchange Center. IBM will repair and return ship the unit, prepaid, to the originating customer's location. This service allows the customer to call IBM Customer Engineering for assistance after the customer has attempted CPAR and is unsuccessful.

### IBM Hourly Service

IBM Hourly Service requires the same procedure to be followed as the repair offering, Customer Carry-In Repair. The customer is charged for repair labor, replacement parts and all handling and shipping costs. Upon request, IBM will provide, for a minimum charge, an estimate of repair charges. IBM Hourly Service does not provide Product Support Center access. < )

(Countries without repair center capability) > IBM On-Site Repair (#9798)

IBM is responsible to come to the customer's site, repair and test the failing machine element. Coverage will represent normal IBM shift coverage only, with additional coverage available as options to the basic coverage. < )

### Remote Assistance

Remote assistance is used by IBM support specialists at the Product Support Center to diagnose 3710 problems not resolved by the customer.

All of the above options except IBM Hourly Service requires access to the 3710 via a customer-provided Control Terminal and auto-answer modem.

**Publications:** Following is a list of the publications available at announcement for the 3710. These documents will be updated to reflect the new 8PCA and the updated version will be available four weeks prior to the 8PCA General Availability.

- IBM 3710 Network Controller Introduction #GA27-3430
- IBM 3710 Network Controller Planning #GA27-3431

Following is a list of the publications available at shipment for the 3710. These documents will be updated to reflect the new 8PCA and the updated versions will be available at the time of shipment of the 8PCA.

- IBM 3710 Network Controller Operator's Guide
- IBM 3710 Network Controller Customer Setup and Relocation
- IBM 3710 Network Controller Problem Report
- IBM 3710 Network Controller Control Terminal Guide
- IBM 3710 Network Controller Repair Center and Maintenance Guide
- IBM 3710 Network Controller Parts Catalog
- IBM 3710 Network Controller Configuration Manual

## SPECIFY

- (Canada only) > Voltage (120V, 60 Hz): No specify code required. <
- (Except Canada) > No specify code required. High voltage and appropriate power cord will automatically default on the three digit country code. Specify codes for low voltage machine may be entered. Appropriate power cords will be automatically ship with low voltage machines. #2804 - Low Voltage. <

The power cables for EMEA and AG-APG will be shipped with the appropriate country wall plug dependent upon the country code. No specify code is required for proper default cord. In countries where low voltage machines are specified, a 4.3m low voltage power cord is automatically shipped.

**Nomenclature:** The nomenclature codes will automatically default on the 3 digit country number. If other than standard is required then specify as follows:

- Canada #2935 for Canadian French

## SPECIAL FEATURES

**Dual EIA RS-232-C/V.24 Communication Adapter (#7001):** Provides for attachment of up to two RS-232-C/V.24 communications lines. Setup by customer. See specify features for communication cables attaching to this feature. Devices attaching to this feature must be the same link level protocol.

**V.35 Communication Adapter (#7005):** Provides for attachment of one V.35 communication line. Setup by customer. See specify features for communication cables attaching to this feature.

**X.21 Communication Adapter (#7010):** Provides for attachment of one leased X.21 communications line. Setup by customer. See specify features for communication cables attaching to this feature.

**Eight-Port Communication Adapter (#7015):** Provides for attachment of up to eight RS-232-C/V.24 DCEs controlling communication lines or eight RS-232-C/V.24 DTEs, or eight RS-422-A/V.11 (displays only) DTEs, or a combination of the above, setup by customer. Attachment cables must be ordered separately. A maximum of eight cables may be connected to this feature. Lines/devices attaching to this feature must be asynchronous protocol.

**128K Storage Expansion Feature (#7020):** Provides additional 128K bytes of storage to the base 384K bytes. Maximum: One. Customer Setup: Yes.

Up to 99 communication adapter features, #7001, #7005, #7010, and #7015 can be ordered for the 3710. They can be all one feature number or a mix of all four feature numbers but cannot exceed a total of 99. Orders will not be checked by AAS for features in excess of the maximum which can physically fit into the 3710 at one time.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

### Communication Cables

The following communication cables must be ordered by part number via MS ORDER through AAS. They are separately charged to the customer. For prices, find the part numbers under the ACCESSORIES section of HONE.

In this table, "DCE" refers to Data Circuit-terminating Equipment (modems etc. used to connect to communication lines), and "DTE" is Data Terminal Equipment (devices that are directly connected to the 3710 (e.g. 3101, 3161, IBM PC, 3274, ...)).

Part Number	Description/ Length	Attaches to Feature #
6319101	EIA/DCE (stub) - 0.6 m	7001 (note 1)
6319127	EIA/DCE - 2.5 m	7001
6319102	EIA/DCE - 6.0 m	7001
6319104	EIA/DCE - 15.0 m	7001
6319128	EIA/DTE - 2.5 m*	7001
6319098	EIA/DTE - 6.0 m*	7001
6319100	EIA/DTE - 14.6 m*	7001
6319129	V.35/DCE - 2.5 m	7005
6319095	V.35/DCE - 6.0 m	7005
6319097	V.35/DCE - 15.0 m	7005
6319130	V.35/DTE - 2.5 m*	7005
6319092	V.35/DTE - 6.0 m*	7005
6319094	V.35/DTE - 15.0 m*	7005
6319089	X.21/DCE - 15.0 m	7010
6319090	X.21/DCE - 70.0 m	7010
6319091	X.21/DCE - 120.0 m	7010
4718243	EIA/DCE - 2.5 m	7015**
4718255	EIA/DCE - 6.0 m	7015**
4718257	EIA/DCE - 15.0 m	7015**
6319124	EIA/CABLE - 0.5 m	7015** (note 2)
6319115	EIA/DTE - 2.5 m*	7015**
6319116	EIA/DTE - 6.0 m*	7015**
4718259	EIA/DTE - 15.0 m*	7015**
6319114	EIA/TERM - 2.5 m***	7015**
4718265	EIA/TERM - 6.0 m***	7015**
4718267	EIA/TERM - 15.0 m***	7015**
6340776	RS422/ DTE - 30.0 m*	7015**
6340780	RS422/ DTE - 120.0 m*	7015**
6340782	RS422/ DTE - 600.0 m*	7015**
6319123	RS422/ DTE - 600-1219m	7015** (note 3)

### Notes:

1. This stub can be connected into cables 6319128, 6319098, or 6319100 to provide attachment to another 3710.

## MACHINES

2. With this adapter cable, current two-port EIA cables can be used with the 8PCA.
  3. Variable length cable, specify length when ordering.
- \* This cable is for direct attachment to a terminal.
- \*\* 7015 refers to the 8 Port Communication Adapter.
- \*\*\* This cable provides for a female connector, which can be plugged into an interchange cable prior to attachment to a terminal.

### Ordering Spare Machine Elements

Service Modem	#6340825
Power Unit	#4718250
Diskette Unit	#4718240
Control Unit	#4718252

Machine elements may be ordered in any quantity to provide spare elements as required by the customer. For shipment, specify machine element (B/M) number at time of order entry. Order at any other time by part number.

**Warranty/Maintenance for Spare Elements:** Spare elements are covered under a one (1) year warranty. The specific service offering for this warranty is Customer On-Site Exchange. The proof-of-purchase is necessary to determine the period of warranty coverage on the elements. Maintenance for spare machine elements, after the warranty period, is available on an IBM Hourly Service basis at an IBM Repair Center. A minimum charge is applied.

### CUSTOMER REPLACEMENT PARTS

- 4765515 - Storage Cartridge Blank
- 4765546 - Key for insertion and removal of machine elements.

4765589 - Communication Adapter Blank for unused adapter positions.

4765597 - X.21 Wrap Plug

6319145 - 8PCA Wrap Plug, RS-232-C

6319146 - 8PCA Wrap Plug, RS-422-A

6340847 - Red Indicator lamp for front operator panel.

6340848 - Green Indicator lamp for front operator

6835348 - V.35 Wrap Plug, V.35 to DCE

6835349 - V.35 Wrap Plug, V.35 to DTE panel.

5214456 - 230V main line fuse.

The following power cord part numbers are for High Voltage machines:

P/N	Countries
2684644	Chile
5640664	Australia, New Zealand
5641083	Japan
5688133	Argentina, Brazil, Korea, Taiwan, Venezuela
6841461	Peru

The following power cord part number is for Low Voltage machines: 8592302.

### SUPPLIES (NONE)



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MACHINES

M 3715.1  
Feb 84

## 3715 PRINTER

[NO LONGER AVAILABLE]  
(Effective March 20, 1984)

### PURPOSE

The 3715 is a printer for all models of the 3741.

### MODELS

- Model 1** 001 40 cps printing rate in both directions  
**Model 2** 002 80 cps printing rate in both directions

**Prerequisites:** #8111 and #8120 or #8121 on the 3741.

### HIGHLIGHTS

The 3715 prints serially in both left-to-right and right-to-left directions using the EBCDIC character set. The maximum print line is 132 print positions at 10 characters per inch spacing. Line spacing is six lines per inch.

Reformatting, editing, disk read, line feed, and printed line length are factors which affect printer throughput. For detail calculation of performance, refer to *3741 Reference Manual* (GA21-9183). In most cases, throughput can be summarized as follows: the 3715 mdl 1 is equal to or faster than the 3713 Printer, and the 3715 mdl 2 is approximately 50 percent faster than the 3715 mdl 1.

When using the 3741 mdls 3 or 4 ACL Translator (#1350), the 3715 mdl 2 is recommended in order to obtain equal or greater throughput than the 3713.

The unit has a pressure-feed platen that permits feeding of forms in a range of 3 to 14-7/8 inches overall width. 15-inch forms can also be accommodated. Continuous forms fold-to-fold length may range from 3 to 14 inches. Edge-punched continuous forms are fed using the adjustable forms tractor, which is standard.

Matrix characters are formed by seven vertical wires printing dots in up to four of seven possible horizontal positions. Refer to *Form-Design Printers Reference Guide* (GA24-3488) for design considerations and limitations. Up to 6-part forms can be printed with a maximum thickness of .018 inches. 5- and 6-part forms should be tried for satisfactory feeding, print registration, and print quality. Card stock continuous forms are not recommended. For optimum handling of continuous forms, the Forms Stand (#4450) is recommended.

**Publications:** *IBM Data Station Operator Guide* (GA21-9131) and *IBM 3741 Data Station Reference Manual* (GA21-9183).

### SPECIFY

- Power: Power is supplied to the 3715 by the attaching 3741, no specify required.
- Color: Specify #9041 for red, #9042 for yellow, #9043 for blue, or #9045 for gray.
- Printer Language Group: Printer graphics are consistent with keyboard arrangement of attaching 3741. If 3715 is ordered for field installation on previously installed 3741, keyboard arrangement feature code of 3741 must be respecified.

#### (Japan only→

To print Katakana language, specify Katakana keyboard arrangement (#2973) on 3741 order. If 3715 is ordered for field installation on previously installed 3741, keyboard arrangement feature code of 3741 must be respecified. ←)

- Machine Nomenclature:

English	#2927	Italian	#2932
French	#2928	Japanese	#2930
German	#2929	Spanish	#2931

### SPECIAL FEATURES (None)

### MODEL CONVERSIONS

Model conversions are field installable.

### ACCESSORIES

**Forms Stand (#4450):** Permits feeding of continuous forms from the carton and provides for forms stacking after printing. This accessory is a one-shelf forms stand. For field installation, order by feature number on MES.

### SUPPLIES

**Ribbons:** A black ribbon, P/N 1136653 or equivalent, is required.

**3720 COMMUNICATION CONTROLLER****PURPOSE**

The 3720 controls data communications between modem attached, directly attached (without a modem) or IBM Token-Ring Network attached terminal devices and one or more directly or remotely connected IBM 4341, 4361, 4381, 303X, 308X 3090, or 937X host processors, or between two host processors. Remote connection may be via PTT provided or customer owned communication facilities.

The 3720 is the base machine. An optional 3721 Expansion Unit provides additional line attachment capability.

**MODELS**

**Model 1 001:** Channel attached Communication Controller with line attachment capability.

**Model 2 002:** Link attached Communication Controller with line attachment capability.

**Model 11 011:** Channel attached Communication Controller with line and IBM Token-Ring Network attachment capability.

**Model 12 012:** Link attached Communication Controller with line and IBM Token-Ring Network attachment capability.

**Customer Setup (CSU):** The 3720 Mdl 2 and 12 are designated Customer Setup thereby offering the customer early availability and relocation flexibility.

**Prerequisites:** A user provided control terminal is required as operator console. (Except Brazil> This terminal may be directly attached (local) or attached via a modem and a switched telephone line (remote). When it is remote, a 1200 bps, duplex modem compatible with the CCITT Recommendations V.22 (Alternative B), <) (Except Brazil> or V.22bis, <) (Except Brazil> operating in asynchronous mode with auto-answer, is required. <)

(Brazil only> A directly attached 3727 console is required. <)

A customer provided modem compatible with CCITT Recommendation (Except Canada> V.23<) (Canada only> V.22<) operating in synchronous mode with autoanswer at 1200 bps over the public switched telephone network is required to attach to the RSF port. This modem has to be compatible with the modems installed at the supporting RSF site.

Should a customer elect not to accept RSF support, then a local console is required.

If channel-attached, the 3720 requires a control unit position on a system channel. See processor sales manual pages for details.

When attaching to a 43XX in EP mode, restrictions are imposed on the number of available subchannels which may be used by the 3720. On the 9370 processors, EP and PEP modes are not supported.

**HIGHLIGHTS**

Characteristics of the 3720 Communication Controller:

- The 3720 is an entry member of the IBM 3725 family. It can operate under the control of the current versions of the same communication program products as the IBM 3725: NCP (Version 4), EP (Release 3 and 4), PEP. (See the Sales Manual Pages of the Program Products to determine the software supported by each model).
- The 3720 mdl 2 and 12 have been designed specifically for operating in a remote environment. A remote switched console, new unattended operation facilities, and the Remote

Support Facility allow the control of a 3720 from remote control centers.

- Attachment of up to 28 lines to the 3720 Mdl 1 and 2. Addition of the 3721 Expansion Unit to the 3720 Mdl 1 or 2 expands this capability to 60 lines, either duplex or half duplex. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.
- Attachment of up to 2 IBM Token-Ring Networks and up to 16 lines to the 3720 Mdl 11 and 12. Addition of the 3721 Expansion Unit to the 3720 Mdl 11 or 12 expands this capability to 48 lines, either duplex or half duplex, plus two Token-Ring Networks. The 3721 Expansion Unit does not provide attachments to IBM Token-Ring Networks. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.

The 3720 mdls 1 and 2 are field-upgradable to mdls 11 and 12 respectively.

- One or two channel adapters in the 3720 Mdl 1 and 11 to connect to the byte multiplexer, block multiplexer or selector channels of host processors.
- Up to two Two Processor Switches (TPSs) to allow one or two channel adapters to be attached to 2 processor channels with non-simultaneous communication.
- 10MB Hard Disk: This disk provides additional storage space. This storage is used for the support of files used by MOSS.
- The 3720 improves the support of high speed lines: By use of a data transfer of 64 byte blocks, four 56K bps or 64K bps, or five 48K bps full-duplex lines can be attached to a scanner, instead of two with the previous IBM 3725 scanners. This enhancement decreases the cost of high speed line attachments.

- Simplified machine structure: The machine structure is simplified by use of a reduced number of required features: five types of line interfaces, one type of Token-Ring interface, one storage feature, and one type of channel adapter. The communication scanners and internal clock controls are included in the base units and the line interfaces may be added or moved by the customer. This allows easy additions and changes to the machine configuration.
- All units except 3720 mdls 1 and 11 (channel attached) are customer set-up (CSU). Configuration upgrades by addition, removal, rearrangement of LICs and TICs can be done by the customer. Such a facility allows easier changes of line configurations and provides additional problem determination facilities.
- Maintenance and Operator Sub-System (MOSS) problem determination facilities are improved: Like the IBM 3725, the 3720 provides a functionally separate processor, which facilitates maintenance and problem determination by providing:

- box event recording
- alert mechanisms
- display of machine status
- diagnostics for the Central Control Unit (CCU), channel adapters, scanners and line interfaces
- utilities to collect microcode dumps and 3720/3721 configuration data and send them to the host for printing
- menus displayed on the screen of the console to provide guidance to the operator.

MOSS facilities are enhanced with the following functions:

- New options for 3720 operations:

- ▲ Storing of an ACF/NCP V4R2 or ACF/NCP Version 4 Subset load module in the 3720: At the request of the network operator, the load module is first loaded from the host into the 3720 memory and then automatically saved onto the 3720 disk. No ACF/NCP control program can be active in the 3720 during this operation.
- ▲ Automatic load and dump of NCP: This option can be individually assigned to a 3720 by the network operator during activation of the NCP. After a power outage, the MOSS re-IPLs the 3720 with the NCP load module stored on the disk, without operator intervention. In case central control unit failure or software error, a dump of the NCP storage is automatically saved on the 3720 disk before the re-load sequence begins. At the completion of the loading, the 3720 notifies the network operator of the outcome of the process: load successful or not, dump available or not. In case of an unsuccessful load, the network operator must initiate an NCP load from the host.
- ▲ Transfer of the NCP dump: After notification that an NCP dump has been saved by a 3720, the network operator can request the online retrieval and transmission to the host. This transfer may involve the full dump (to be stored in the host library) or partial dump (to be displayed at the network console). The NCP dump stored on the 3720 disk must be retrieved and/or erased by the network operator before a new NCP dump can be saved on the 3720 disk. When there is an NCP dump already stored on the disk, the automatic load of NCP is performed without dump of the storage, unless the error condition takes place within 10 minutes of the end of NCP initialization. In this case, there is no automatic dump/load process and the 3720 waits for an intervention of the network operator.
- ▲ Loading of the NCP from the load module stored on 3720 disk at operator request either from the network console, or from the 3720 local/remote console, or from the 3720 operator panel.
- Automatic scanner re-IML in case of failure: This new facility further improves the availability of the communication scanner.  
  
When a scanner fails, the MOSS will take a scanner dump and re-IML this scanner without operator intervention. At the completion of these actions, the MOSS will notify the host of the outcome of the operations. If they were successful, the lines of this scanner may be reactivated from the host. If they were not successful, manual intervention will be required at the local or remote 3720 operator console.
- Automatic analysis of Box Event Records (BERs): MOSS analyzes automatically the box event records and provides a reference code which will be used by the customer and the IBM service organization for determining the probable cause of failure, and the action to be taken (see section Problem Determination).
- All internal clocks set by software: The MOSS operator console is now used to set the speed of the clock, for direct attached synchronous terminals. Previously, hardware straps had to be put in place by IBM service personnel. Speeds are set by line, not by LIC as in the 3725. The speed for other type of attachments, including direct attachment of asynchronous terminals, is specified via the SSP program product, as previously.
- Support of IBM Communication Network Management (CNM) direction: The 3720 supports IBM's CNM direction by sending error related information to the NetView or NPDA (Network Problem Determination Application) program product running in a host processor.

Alerts generated for 3720 are displayed on the network control terminal by NetView (MVS, VM) or NCCF/NPDA (VSE). If Netview or NCCF/NPDA are not available, the alerts will be displayed on the VTAM console (except for the IBM Token-Ring Network alerts) by certain VTAM releases. See the Sales Manual Pages of the Program Products to determine which VTAM releases provide this capability.

This enhanced CNM support further improves the problem determination facilities in an SNA network by allowing an easier identification of the failing unit in the SNA network.

- Support of IBM 586X modem Link Problem determination Aid (LPDA 2) enhancements.
- Support of IBM and non-IBM DTE's with X.25 interface: This support is provided by the X.25 SNA Interconnection PRPQ. It is then possible to convey X.25 traffic using the SNA backbone network and the SNA transport facilities.

The IBM CNM's direction is emphasized for X.25 resources by using the X.25 SNA Network Supervisory Function (NSF) PRPQ in the SNA host processor.

- Remote Support Facility (RSF): RSF allows IBM support specialist, at the Hardware Central Service, to diagnose 3720 problems remotely (see "Maintenance Facilities" section). RSF will improve the availability of the 3720 by allowing an IBM support specialist to handle a problem sooner, by allowing microcode problems to be fixed quicker without on-site assistance, and by allowing the required part to be ordered before the IBM service representative comes on site for the hardware maintenance.
- Maintenance via Remote Support Facility (RSF): Customers with a machine covered under purchase warranty or IBM maintenance agreement and the required hardware configuration will be entitled to connect to an IBM Remote Support Facility (RSF).

Any terminal, which is equivalent to a 3101 Mdl 23, may be used as a console, such as: the 3161 Mdl 11 or 12 running in 3101 mode, the 5150 or 5160 running the IBM 3101 Emulation Program (6024-042), the 3163 Mdl 11 or 12 running in 3101 mode, and the 3164 Mdl 11 or 12 running in 3101 mode.

A 1200 bps duplex modem compatible with the Bell 212A operating in Asynchronous mode with auto-answer, is required to connect the remote console via the switched telephone network.

A customer provided modem compatible with a Bell 212A operating in Synchronous mode with auto-answer at 1200 bps over the public switched telephone network is required to attach to the RSF port. This modem has to be compatible with the modems installed at the supporting RSF site.

- Microcode Releases: Mandatory Microcode 'Engineering Changes' will be automatically shipped to the customer.

## Machine Organization

**Base Machine:** The 3720 Mdl's 1, 2, 11 or 12 are the base machines and contain:

- Central Control Unit
- Main Storage of 1MB
- 10M byte Disk
- Diskette Drive
- Maintenance and Operator Sub-System (MOSS)
- One Communication Scanner including internal clock controls.

The internal clock supports the following bit rates:

- Category 1 Rates

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- ▲ 50, 110, 134.5, 200, 300, 600 and 1200 bps for start/stop or synchronous operation.
- ▲ 75, 100, 2400, 4800, 9600 and 19200 bps for start/stop operation only.

The transmission may be duplex or half-duplex to modem attached or directly attached terminals.

### - Category 2 Rates

- ▲ 2400, 4800, 9600, 19200, 38400, 55885 and 245760 bps for directly attached synchronous terminals.

Category 1 speeds are set by NCP or EP. Category 2 speeds are set from the operator console.

The 3720 Mdl 1 and 11 also provide:

- One basic Channel Adapter (CA) plus one optional CA

They attach to a byte multiplexer, block multiplexer or selector channel of an IBM 4341, 4361, 4381, 303X, 308X, 3090 or 937X host processor. Where the processor is not a 303X or a 937X, they attach (only with ACF/NCP) also to the IBM 3044 Fiber Optic Channel Extender Link, allowing one to install the 3720 Mdl 1 or 11 at up to 2km (6666 ft) from the host. They attach also to the IBM 3044 Fiber Optic Channel Extender Link, allowing to install the 3720 Mdl 1 and 11 at up to 2 km (6666 ft) from the host except with 303X.

- Up to two Two Processor Switches (TPSs), which allow a channel adapter to be attached to 2 processor channels with non-simultaneous communication.

The 3720 Mdl 1 or Mdl 2 may contain in addition:

- One storage increment of 1MB
- Up to seven Line Interface Couplers (LICs) Type 1, 2, 3, 4A, 4B.

The 3720 Mdl 11 or Mdl 12 may contain in addition:

- One storage increment of 1MB
- Up to four Line Interface Couplers (LICs) Type 1, 2, 3, 4A, 4B.
- Up to two Token-Ring Interface Couplers (TICs) Type 1

The 3720 mdls 1 and 2 are field-upgradable to models 11 and 12 respectively.

**Expansion:** One 3721 Expansion Unit may be connected to the 3720. The 3721 Expansion Unit is installed on top of the 3720 and allows attachment of up to 32 additional lines.

Two models are available: Mdl 1 has one scanner controlling up to 8 LICs, Mdl 2 has two scanners controlling 4 LICs each. See 3721 Expansion Unit sales pages for additional information.

**Operator Console:** For the integration of the 3720 in the network and for problem determination, a user provided control terminal is required as the operator console.

(Except Brazil> This terminal may be directly attached (local) or attached via a modem and a switched telephone line (remote). The attachment is only required while the above-mentioned operations are performed.

Any terminal, which is equivalent to IBM 3101 Mdl 23, may be used as a console, such as: the IBM 3161 model< ) 11 or (Except Brazil> 12 running in 3101 mode, the IBM PC< ) 5550, (Except Brazil> 5150 or 5160 running the IBM 3101 Emulation Program< ) no. 6024-042, (Except Brazil> the IBM 3163 model< ) 11 or (Except Brazil> 12 running in 3101 mode, and the IBM 3164 mdl< ) 11 or (Except Brazil> 12 running in 3101 mode.

A single remote operator console may be used to manage multiple 3720s by attaching it to each 3720 via a modem and a switched communication line.

Customers running EP only (no NCP/PEP) should provide a console in order to receive error alerts normally available at the VTAM op-

erator console.< ) (Brazil only> A directly attached 3727 console is required.< )

**Performance:** The maximum number of lines and IBM Token-Ring Networks capable of concurrent operation is a function of line speed, line protocols, the 3720 control program installed and the application work load. The number of lines which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in the customer's situation.

The HONE Configurator CF3725 or the 3720 Configuration Guide should be used to perform such an analysis.

## Maintenance Facilities

**Remote Support Facility (RSF):** Customers with a machine covered under purchase warranty, lease/rental or IBM maintenance agreement and the required hardware configuration will be entitled to connect to an IBM Remote Support Facility (RSF).

RSF allows IBM product specialists in a remote support location to establish a connection with the customer's 3720, after customer authorization. These product specialists can, from the support location, monitor machine operation or perform problem diagnosis on the 3720. These capabilities include remote examination of machine error records and the remote initiation of diagnostic programs. Utilization of RSF may improve the availability of the 3720 by shortening the total time necessary to analyze a hardware failure, identify a likely failing component and to dispatch a part and service representative to the machine's location.

In addition the product specialists will also be able to use the remote console facilities from their terminal. Product Engineering will have the capability to transfer temporary patches to the customer's machine to solve very urgent situations.

**Problem Determination Procedures:** The automatic analysis of Box Event Records (BERs) is a new MOSS function which facilitates the problem determination. BERs are analyzed automatically by MOSS which provides an reference code in the alert sent to the network operator.

This reference code allows a faster problem determination. For simple problems, the customer can identify more easily, in the 3720 Problem Determination guide, for each reference code, the probable cause of failure, and the recommended actions.

If the problem is more complex and assistance of Customer Engineering service is necessary, the customer will report the reference code to them. The IBM service personnel will use this code to identify suspected FRUs (field replaceable unit) remotely. This may eliminate on-site analysis and wait time for required parts, resulting in reduced controller outage time.

**Customer Responsibilities:** See M2700 sales pages.

**Communications Facilities:** The 3720 operates over PTT provided or equivalent customer owned communication facilities. For information concerning these facilities, see the M2700 sales pages.

## Data Communication Equipment

**IBM Modems:** The following IBM modems or units may be used with the 3720:

Modem (models)	Speed (bps)	Lines
3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1/2	2400/1200	Nonswitched or switched voice grade
3864-1/2	4800/2400	Nonswitched or switched voice

3865-1/2	9600/4800	grade Nonswitched voice grade
3868-1	2400/1200	Nonswitched voice grade
3868-2	4800/2400	Nonswitched voice grade
3868-3/4	9600/4800	Nonswitched voice grade
5811-10	2400/4800/ 9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400/4800/ 7200/9600	Nonswitched baseband
5811-28		Rack mount version of 5811-20
5812-10	2400/4800/ 7200/9600	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-2/3	9600/7200/ 4800	Nonswitched voice grade
5866-2/3	14400/9600	Nonswitched voice grade
5868-52		Rack mount version of 5865-2
5868-62		Rack mount version of 5866-1/2

**Note:** 4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**PTT Mandatory DCEs:** The 3720 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110 and the relevant CCITT Recommendations for data transmission speed.

The 3720 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.35 and ISO Standard 2593.

**Public Data Networks:** Public Data Networks are attached as listed in the charts of the M2700 sales pages.

**Non-IBM DCEs:** Non-IBM DCEs complying with EIA RS-232C, CCITT Recommendations V.24/V.28 or V.35 may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin.

**Automatic Calling Equipment:** The 3720 attaches the PTT mandatory autocal equipment complying with CCITT Recommendation V.25 and ISO Standard 2110.

OEM automatic calling equipment which comply with EIA RS-366 or CCITT Recommendation V.25 may be attached under the provisions of the IBM Multiple Supplier Systems Policy.

#### Configuring and Ordering Procedures

- For a new machine: A new machine must be configured with the aid of the HONE Configurator CF3725, or the "Configuration Guide", GA33-0063. Either procedure yields a list of feature codes and specify codes, which is used to order the machine, and a pictorial diagram showing the positions of the LICs. A copy of this diagram should be given to the customer, as it will be needed to generate NCP or EP and to plan the installation of the LIC cables i.e., the DCE and other communication cables.

A copy of the CF3725 output of 3720 Mdl 1 and 11 must also be given to Customer Engineering as it will be needed to install the LIC cables.

At order confirmation time the machine configuration must be verified by the configurator CF3725.

An operator console is required. It may be locally or remotely attached.

- For an MES: The HONE Configurator CF3725 or the Configurator Guide and the setup form of the machine may be used to configure the MES. This procedure yields an updated pictorial diagram of the LICs and a list of feature codes and specify codes which is used to order the MES.
- External Cables: Note: 3720/3721 LIC cables are NOT interchangeable with 3705/3725 LIC cables.

External cables are ordered via MES or cable order form.

(Canada, Latin America, Taiwan only) IBM supplies TIC cables at standard length of 23 meters, LIC and console cables at standard length of 13.5m, except for direct attached DTEs on LIC Types 4A and 4B, where the standard length is 30 meters. Order the corresponding cable group as defined in the the Planning and Site Preparation Guide (PSPG). These cables are shipped from Poughkeepsie.

For shorter cables or for channel cables, order the corresponding cable group at the specified length as defined in the PSPG.

For longer cables, order by P/N at the specified length on < (Latin America, Taiwan only) an MES < (Canada only) a cable order form 2642. < (Canada, Latin America, Taiwan only) These cables are shipped from Poughkeepsie. Inquire into the < (Latin America, Taiwan only) QSLM file < (Canada only) FED parts price list < (Canada, Latin America, Taiwan only) for prices. <

(Except Canada, Latin America, Taiwan) Order all cables by cable group number as shown under "3720 Custom Length Cables" in the PSPG. These cables are shipped from Fujisawa. <

For additional information on the available cable types and lengths, refer to the "Planning and Site Preparation Guide", GA33-0061.

For the basic channel adapter of the 3720 Mdl 1 and 11 order cable groups #3920 and EPO cable group #1178, if required.

For the direct attached Operator Console, IBM supplies a cable of up to 13.5m. This cable is obtained by ordering cable group #1631 or #1633 depending on the type of console. Additional length up to 150m may be ordered by MES.

For the modem attaching to the remote operator console port IBM supplies a cable of up to 13.5m. This cable is obtained by ordering cable group #1632.

The same cable type attaches the modem used for RSF (Remote Support Facility).

#### SPECIFY

These specify codes are only available at time of manufacture.

- Voltage: (Canada only) 3720-1/11 208 or 240V 60 Hz: no specify code is required. Specify #2822 if 120V 60 Hz are needed. 3720-2/12 120V 60 Hz: no specify code is required. Specify #2793 if 208 or 240 V 60 Hz are needed. <

(Except Canada) No specify code is required to order the default option, which is high voltage (200 to 240 V) and 50 Hz. If other than the default option is required then specify:

#2822 for low voltage (100 to 127 V) and 50/60 Hz  
#2793 for high voltage and 60 Hz <

- Power Cord: (Canada only) 3720-1/11 A 4.3m cord with non-locking plug is standard. No specify code required. Specify #9986 for a 1.8m power cord, #9980 if a locking plug is

needed and #9020 if a moisture resistant plug is needed. 3720-2/12 A 4.3m cord with non-locking plug is standard. No specify code required. Specify #9986 for a 1.8m power cord and #9890 if a locking plug is needed and #9020 if a moisture resistant plug is needed.<)

(Except Canada and Japan> No specify code is required. For most countries the most commonly used plug will be selected by the 3-digit country number and the ordered voltage and frequency. Refer to the "Planning and Site Preparation Guide", GA33-0061, for details on the available plugs.

If other than standard is required, specify #2710 for a power cord without plug.<)

(Japan only> No specify code is required to order a non-locking plug. Specify #9890 if a locking plug is required for the low voltage. The locking plug is not available for the high voltage.<)

- Machine Nomenclature: No specify code is required to order the default option.

The default options are:

Argentina	Spanish
Bolivia	Spanish
Chile	Spanish
Colombia	Spanish
Costa Rica	Spanish
Dominican R.	Spanish
Ecuador	Spanish
El Salvador	Spanish
Guatemala	Spanish
Haiti	Spanish
Honduras	Spanish
Mexico	Spanish
Nicaragua	Spanish
Panama	Spanish
Paraguay	Spanish
Peru	Spanish
Uruguay	Spanish
Venezuela	Spanish
Others	English

If other than the default option is required then specify as follows:

#2924 for English  
#2928 for French  
#2931 for Spanish

- Documentation Group:

All machines are shipped with English publications. In addition translated documents, as listed in the default options or if specified as indicated below, are shipped.

The default options are:

Argentina	Spanish
Bolivia	Spanish
Chile	Spanish
Colombia	Spanish
Costa Rica	Spanish
Dominican R.	Spanish
Ecuador	Spanish
El Salvador	Spanish
Guatemala	Spanish
Haiti	Spanish
Honduras	Spanish
Japan	Kanji
Mexico	Spanish
Nicaragua	Spanish
Panama	Spanish
Paraguay	Spanish
Peru	Spanish

Uruguay Spanish  
Venezuela Spanish

If other than the default option is required then specify as follows:

#0077 for Canadian French  
#0073 for Kanji  
#0060 for Spanish

- Safety Labels: No specify code is required to order the default option.

The default options are:

Argentina	Spanish
Bolivia	Spanish
Brazil	Portuguese
Chile	Spanish
Colombia	Spanish
Costa Rica	Spanish
Dominican R.	Spanish
Ecuador	Spanish
El Salvador	Spanish
Guatemala	Spanish
Haiti	Spanish
Honduras	Spanish
Japan	Kanji
Mexico	Spanish
Nicaragua	Spanish
Panama	Spanish
Paraguay	Spanish
Peru	Spanish
Uruguay	Spanish
Venezuela	Spanish
Others	English

If other than the default option is required then specify as follows:

#0924 for English  
#0938 for English/French  
#0930 for Kanji  
#0933 for Portuguese  
#0931 for Spanish

### SPECIAL FEATURES

The base 3720 may be upgraded by the addition of the following features.

**Second Channel Adapter (#1561):** Provides the logical and physical interface between a 3720 Mdl 1 or 11 and an IBM 4341, 4361, 4381, 303X, 308X, 3090, or 937X host processor. It attaches to a byte multiplexer, block multiplexer or selector channel. Where the processor is not a 303X or a 937X, they attach (only with ACF/NCP) also to the IBM 3044 Fiber Optic Channel Extender Link. It may be equipped with a Two Processor Switch. With this feature order channel cable groups #3920 and EPO cable group #1178, if required. Maximum: One per 3720 Mdl 1 or 11. Prerequisites: None. Limitation: Not available on 3720 Mdl 2 or 12. The combination 3720/3044/303X is not supported. Field Installation: Yes.

**Line Interface Coupler (LIC) Type 1 (#4911):** Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. Each interface may also be used as a port for EIA RS-366/V.25, X.20bis, or X.21bis. LIC Type 1 provides direct (modemless) attachment at up to 19200 bps. Cables: For each LIC type 1, four cables must be ordered, for DCE, autocal equipment and/or direct attachment. Order cable group #1604 for DCE attachment, or cable group #1621 for attachment to NTT DCEs, cable group #1616 for attachment to automatic calling units, or cable group #1634 for attachment to NTT automatic calling units, cable group #1607 for direct attachment of asynchro-

nous DTEs like 3161, 3163, 3164, 3101 and TTY 33/35, or cable group #1611 for direct attachment of synchronous DTEs. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Seven per 3720 Mdl 1 or 2. Four per 3720 Mdl 11 or 12. Prerequisites: None. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 2 (#4921):** Provides attachment for one communication line at speeds up to 256K bps. LIC Type 2 supports either duplex or half duplex data transmission. It has a digital interface for attachment to a non-switched "wideband" Type 8751, 8801 or 8803 Service. Cables: For each LIC type 2 order one cable group #1614. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable length. Limitations: Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Seven per 3720 Mdl 1 or 2. Four per 3720 Mdl 11 or 12. Prerequisites: None. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 3 (#4931):** Provides attachment for one non-switched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 245.76K bps. Cables: For each LIC type 3 order one cable group #1613 for DCE attachment or cable group #1605 for direct attachment. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Seven per 3720 Mdl 1 or 2. Four per 3720 Mdl 11 or 12. Prerequisites: None. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 4A (#4941):** Provides four CCITT X.21 interfaces as defined in IBM SRL GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and non-switched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps. Cables: For each LIC Type 4A four cables for DCE and/or direct attachment must be ordered. Order cable group #1606 for DCE attachment or cable group #1608 for direct attachment. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. This LIC operates at transmission speeds up to 9600 bps. Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Seven per 3720 Mdl 1 or 2. Four per 3720 Mdl 11 or 12. Prerequisites: None. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 4B (#4942):** Provides one CCITT X.21 interface as defined in IBM SRL GA27-3287 for a communication line operating at speeds up to 256K bps. Both switched and non-switched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 245.76K bps. Cables: For each LIC Type 4B order one cable group #1606 for DCE attachment or one

cable group #1608 for direct attachment. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Seven per 3720 Mdl 1 or 2. Four per 3720 Mdl 11 or 12. Prerequisites: None. Field Installation: Yes, by customer.

**Token-Ring Interface Coupler (TIC) Type 1 (#4991):** The TIC is a set of components and a microprocessor running under the control of a resident microcode which controls the IBM Token-Ring Network using standard protocols. The TIC operates under the control of ACF/NCP only. It provides one attachment to an IBM Token-Ring Network. Cables: For each TIC Type 1 order one cable group #1666. When the 3720 is installed in an IBM Token-Ring Network where IBM Cabling System Type 3 Specified Media (telephone twisted pair) is used, a Data Grade Media to Type 3 filter is required between the 3720 TIC cable and the telephone twisted pair wiring. Refer to "IBM Token-Ring Network Twisted Pair Media Guide", GA27-3714. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Maximum: Two per 3720 Mdl 11 or 12. Limitation: Not available on 3720 Mdl 1 or 2. Field Installation: Yes, by customer.

**Storage Increment 1MB (#7100):** Provides a main storage increment of 1MB to allow up to 2MB of memory. Maximum: One per 3720. Field Installation: Yes.

**Two Processor Switch (#8320):** Provides a second channel interface to attach the first or the second channel adapter to a Multiprocessor System (MP) or to two channels of the same or different processors, with non-simultaneous communication. With this feature order channel cable groups #3920 and EPO cable group #1178, if required. Maximum: Two per 3720 Mdl 1 or 11. Prerequisites: None for the first #8320. First TPS (#8320) Channel Adapter (#1561) for the second #8320. Limitation: Not available on 3720 Mdl 2 or 12. Field Installation: Yes.

## MODEL CONVERSIONS

Field conversions can be made from mdls 001 to 011 and from 002 to 012. No other changes are possible.

## ACCESSORIES

Accessories are ordered via MSORDER (category = accessories/supplies) on AAS specifying the following part numbers:

- #1643894 - Additional key to open the 3720/3721 covers
- #6398770 - Additional empty cassette to replace LICs or TICs being removed

## SUPPLIES (NONE)

## 3721 EXPANSION UNIT

### PURPOSE

Provides additional line attachment capability to the 3720 Mdl 1, 2, 11 or 12 Communication Controllers.

### MODELS

**Model 1 001:** Expansion Unit with one scanner.

**Model 2 002:** Expansion Unit with two scanners.

**Customer Setup (CSU):** The 3721 Mdl 1 and 2 are designated Customer Setup thereby offering the customer early availability and re-location flexibility.

### HIGHLIGHTS

Allows attachment of up to 32 additional lines to 3720 Mdl 1, 2, 11, or 12. It is available in two versions:

- 3721 Mdl 1, which is equipped with one communication scanner controlling 8 LICs.
- 3721 Mdl 2, which is equipped with two communication scanners controlling 4 LICs each.

Internal clock controls are included for all the LICs. The supported bit rates are the same as for 3720.

**Communications Facilities:** The 3721 operates over PTT provided or equivalent customer owned communication facilities. For information concerning these facilities, see the M2700 sales pages.

**Data Communication Equipment:** The 3721 attaches the same DCEs as the 3720.

**Configuring and Ordering Procedures:** See the M3720 pages.

### SPECIFY

These specify codes are only available at time of manufacture.

- **Voltage:** (Canada only) Specify the same voltage as the one used by the associated 3720 i.e., #2822 for 120 V 60 Hz and #2793 for 208 or 240 V 60 Hz. <) (Except Canada) > No specify code is required to order the default option, which is high voltage (200 to 240 V) and 50/60 Hz. If other than the default option is required then specify:
  - #2822 for low voltage (100 to 127 V) and 50/60 Hz <)
- **Safety Labels:** No specify code is required to order the default option.

The default options are:

Argentina	Spanish
Bolivia	Spanish
Brazil	Portuguese
Chile	Spanish
Colombia	Spanish
Costa Rica	Spanish
Dominican R.	Spanish
Ecuador	Spanish
El Salvador	Spanish
Guatemala	Spanish
Haiti	Spanish
Honduras	Spanish
Japan	Kanji
Mexico	Spanish

Nicaragua	Spanish
Panama	Spanish
Paraguay	Spanish
Peru	Spanish
Uruguay	Spanish
Venezuela	Spanish
Others	English

If other than the default option is required then specify as follows:

- #0938 for English/French
- #0930 for Kanji
- #0933 for Portuguese
- #0931 for Spanish
- #0924 for English

### SPECIAL FEATURES

The base 3721 may be upgraded by the addition of the following features.

**Line Interface Coupler (LIC) Type 1 (#4911):** Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. Each interface may also be used as a port for EIA RS-366/V.25, X.20bis, or X.21bis.

LIC Type 1 provides direct (modemless) attachment at up to 19200 bps.

**Cables:** For each LIC type 1, four cables must be ordered, for DCE, autocal equipment and/or direct attachment. Order cable group #1604 for DCE attachment, or cable group #1621 for attachment to NTT DCEs, cable group #1616 for attachment to automatic calling units, or cable group #1634 for attachment to NTT automatic calling units, cable group #1607 for direct attachment of asynchronous DTEs like 3161, 3163, 3164, 3101 and TTY 33/35, or cable group #1611 for direct attachment of synchronous DTEs. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Eight per 3721. Prerequisites: None. Specify: #9211 for LICs type 1 connected to the second scanner for 3721 Mdl 2. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 2 (#4921):** Provides attachment for one communication line at speeds up to 256K bps. LIC Type 2 supports either duplex or half duplex data transmission. It has a digital interface for attachment to a non-switched "wideband" Type 8751, 8801 or 8803 Service. Cables: For each LIC type 2 order one cable group #1614. Refer to the "Planning and Site Preparation Guide", GA33-0061 and GC22-7064, for information on available cable length. Limitations: Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Eight per 3721. Prerequisites: None. Specify: #9221 for LICs type 2 connected to the second scanner of 3721 Mdl 2. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 3 (#4931):** Provides attachment for one non-switched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 245.76K bps. Cables: For each LIC type 3 order one cable group #1613 for DCE attachment or cable group #1605 for direct attachment. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Eight per 3721. Prerequisites: None. Specify: #9231 for LICs type 3 connected to the second scanner of 3721 Mdl 2. Field Installation: Yes, by customer.

## MACHINES

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**Line Interface Coupler (LIC) Type 4A (#4941):** Provides four CCITT X.21 interfaces as defined in IBM SRL GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and non-switched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps. The DTEs directly attached to the same LIC must operate at the same speed. Cables: For each LIC Type 4A four cables for DCE and/or direct attachment must be ordered. Order cable group #1606 for DCE attachment or cable group #1608 for direct attachment. Refer to the "Planning and Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. This LIC operates at transmission speeds up to 9600 bps. Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Eight per 3721. Prerequisites: None. Specify: #9241 for LICs type 4A connected to the second scanner of 3721 Mdl 2. Field Installation: Yes, by customer.

**Line Interface Coupler (LIC) Type 4B (#4942):** Provides one CCITT X.21 interface as defined in IBM SRL GA27-3287 for a communication line operating at speeds up to 256K bps. Both switched and non-switched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 245.76K bps. Cables: For each LIC Type 4B order one cable group #1606 for DCE attachment or one cable group #1608 for direct attachment. Refer to the "Planning and

Site Preparation Guide", GA33-0061, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. Refer to the "3720 Configuration Guide", GA33-0063, to determine the number of LICs which may be connected to a given scanner. Maximum: Eight per 3721. Prerequisites: None. Specify: #9242 for LICs type 4B connected to the second scanner of 3721 Mdl 2. Field Installation: Yes, by customer.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

Accessories are ordered via MSORDER (category = accessories/supplies) on AAS specifying the following part numbers:

- #1643894 - Additional key to open the 3720/3721 covers
- #6398770 - Additional empty cassette to replace LICs or TICs being removed

## SUPPLIES (NONE)

## 3725 COMMUNICATION CONTROLLER MODEL 1

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 3725 Model 1 controls data communications between modem-attached or directly-attached (without a modem) or IBM Token-Ring Network attached terminal devices and one or more directly- or remotely-connected S/370 (except mdls 115 and 125), 303X, 308X, 3090, 43XX, 9370 host processors, or between two host processors. Remote connection may be via PTT -provided or customer-owned communication facilities. The 3725 mdl 1 is the base machine. An optional 3726 provides additional line and channel attachment capability. A 3727 console is required for installation, operation, and maintenance.

The following is a brief summary of the 3725 Communication Controllers:

Comm Cntrlr	Max Lines*	Max Host Stg	Host Program	Comm Cntrl Program
3725-1	256 256	3M 1M	VTAM/TCAM BTAM	ACF/NCP-PEP EP
3725-2	80 80	3M 1M	VTAM/TCAM BTAM	ACF/NCP-PEP EP

\* Maximum lines that can physically attach, CF3725 is required to predict actual line attachment capabilities.

See individual pages for each Communication Controller and for information on additional features.

### MODEL 1

#### Model 1 001

**Prerequisites:** If channel-attached, the 3725 requires a control unit position on a system channel. See processor pages for details. When attaching to a 4321 or 4331 in EP mode, restrictions are imposed on the number of available subchannels which may be used by the 3725. On the 9370 processors, EP and PEP modes are not supported.

### HIGHLIGHTS

The 3725 is a modular, programmable communication controller, which runs under the control of:

- Either ACF/NCP Version 2 for the 3725 or EP/3725 R1 or both in PEP mode.
- Or ACF/NCP Version 3 or Version 4 or EP/3725 R2 or both in PEP mode. (See Program Products and SCP sections for details.)

Its programmability allows a high degree of flexibility in tailoring a data communications system to the customer's requirements. In addition, it plays an active role in Communications Network Management (CNM) by providing data to the Network Communications Control Facility (NCCF) and the Network Problem Determination Application (NPDA).

The machine structure is simplified by having a small number of features: Five types of line interfaces, one storage feature, one type of communication scanner and one type of channel adapter. This allows easy additions and changes to the machine configuration.

Characteristics of the 3725 include:

- LSI technology for better RAS characteristics, lower power consumption, and less floor space than previous communication controllers.
- Increased internal performance (compared to the 3705-II) for high-speed lines and large networks.
- Attachment of high-speed lines which use the modulo 128 function of ACF/NCP for INN and BNN links.
- 512K bytes up to 3M bytes of main storage, by 256K byte increments, to accommodate larger networks and higher speed lines.
- Maintenance and Operator Subsystem (MOSS), a functionally separate processor, facilitates maintenance and problem determination by providing:
  - box error logging
  - alert mechanisms
  - display of machine status
  - diagnostics for the Central Control Unit (CCU), channel adapters, scanners and line interfaces
  - utilities to:
    - ▲ collect microcode dumps and send them to the host for printing
    - ▲ provide actual configuration data, help the customer to plan for MES, and store this information on the MOSS diskette via the Graphic Configuration File for further console display or update. This information can be transferred to the host where the machine diagram can be printed by ACF/SSP
    - ▲ allow the operator to keep a current Line Description File, providing the physical address, symbolic name, speed, and protocol of each connected line. This file, stored on the MOSS diskette, may be transferred to the host and printed by ACF/SSP.
- Improved RAS Characteristics:
  - Reliability and availability of the 3725 are enhanced by the following elements:
    - ▲ Extensive error detection, including storage protection against inadvertent overlays
    - ▲ Functional building block design (most adapter errors are contained within a single building block and thus will not take the system down)
    - ▲ Error correcting code for the main storage and scanner storage
    - ▲ Error by-pass facilities: Microcode re-IPLs, system re-IPLs and dynamic reconfiguration of SNA resources
    - ▲ Automatic first-level problem determination with alert messages, which report hardware errors to the network operator and recommend actions
    - ▲ Enhanced problem determination aids
    - ▲ Automatic power-on when power returns after loss
    - ▲ Port Swapping which allows the operator to logically swap a line from a failing port to a spare port without involvement of the host processor.
  - Serviceability of the 3725 is improved by:
    - ▲ Many host-independent functions for installation and maintenance

- ▲ Error information logging/retrieval
  - ▲ Diagnostics and trouble shooting facilities
  - ▲ Concurrent maintenance for MOSS diskette drive and console
- Network Management and Problem Determination: Considerable function has been designed into this communication controller to provide maximum availability to the customer. The 3725 MOSS provides problem determination and recovery procedures that are designed to be easily understood and used by the operator; e.g.:
    - Stand Alone Link Test facility to test an SDLC Communication link attaching another 3725 or 3705, without involvement of a host or a control program.
    - Line Interface Display to monitor at the console the status of most of the control leads on a line interface.

The 3725 supports IBM's CNM (Communications Network Management) direction by sending error related information to the Network Problem Determination Application (NPDA) running in a host processor under the support of the Network Communications Control Facility (NCCF). This enhanced CNM support provides better problem determination in SNA networks. The basic NCP problem determination functions (alerts) are also offered in the non-NPDA environment, but they are not available in EP mode.

- Attachment of up to 96 lines to the 3725: Addition of the 3726 to the 3725 expands this capability to 256 lines, either duplex or half-duplex. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.
- Attachment of up to four separate IBM Token-Ring Networks to the 3725; addition of the 3726 to the 3725 expands this capability to eight separate IBM Token-Ring Networks.
- One or two channel adapters in the 3725 to connect to the byte multiplexer, block multiplexer or selector channels of host processors. Four more channel adapters can be installed in the 3726.
  - Configuration Aids: The HONE Configurator CF3725 and the "Configuration Guide", SA33-0012, are available to IBM representatives to assist in configuring a 3725 to specific network requirements. The CF3725 configurator provides configurations with feature and specify codes, cable lists as well as storage and performance estimates. In CF3725 a number of sample configurations are also available for guidance.

### Machine Organization: The 3725 mdl 1 contains:

- Central Control Unit: Executes instructions to control communication scanners and channel adapters. The CCU runs under the control of ACF/NCP for the 3725, EP/3725 or both in PEP mode.
- Main Storage: Houses a 3725 network control program (NCP, EP, PEP) and other program products loaded from the host processor and provides buffers for the data exchanged with the channel adapters and the lines. The base machine includes 512K bytes of storage as standard.
- Maintenance and Operator Subsystem (MOSS): Provides IPL and utility procedures for the 3725 mdl 1 operator. It includes an independent processor with its microcode, a diskette drive and an attachment for the operator console.
- Transmission Subsystem (TSS): Provides the physical connection to communication facilities. It consists of Line Attachment Bases (LABs) with microprocessor-based scanners, Line Interface Couplers (LICs) and optional Internal Clock Controls (ICCs). The base machine includes 2 LABs called CLABS. Each CLAB has one scanner and can attach up to 32 lines via optional LICs. Integrated DCEs (modems) are not available for the 3725 and 3726.
- Token-Ring Subsystem (TRSS): Provides the physical connection to IBM Token-Ring Network. It consists of Line and

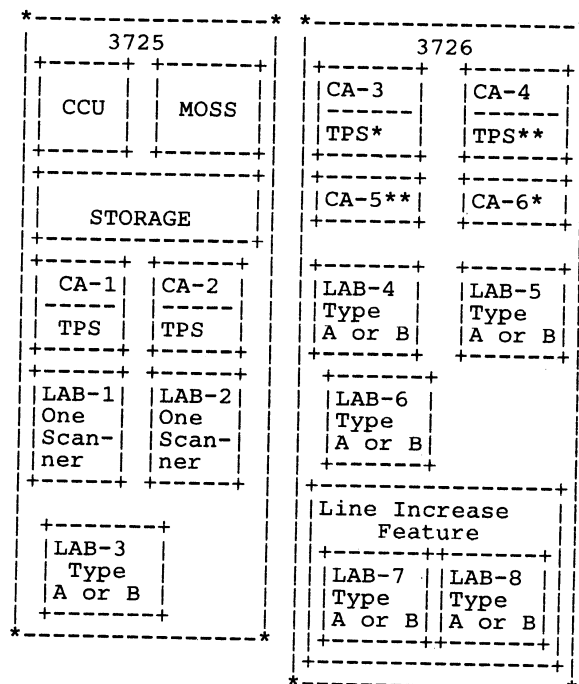
Token-Ring Attachment Bases (LABs) with Token-Ring Multiplexer and Token-Ring Interface Couplers (TICS).

The 3725 mdl 1 may also contain:

- Channel Adapters (CAs): Provide physical connection to host channels. An optional two processor switch allows a channel adapter to be attached to two processor channels, with non-simultaneous communication. The base machine provides a physical base for two Channel Adapters and two Two-Processor Switches.

**Expansion:** One 3726 Communication Controller Expansion may be connected to the 3725 mdl 1. The 3726 allows attachment of up to 160 additional lines and/or up to four additional single channel adapters or two additional channel adapters equipped with Two-Processor Switches. See M3726 pages for additional information.

**Console:** The 3725 mdl 1 requires a primary 3727 Operator Console for installation, operation and maintenance; see M3727 pages for details. A second 3727 Operator Console may be used as an alternate operator console. The operator consoles are directly attached; i.e., no DCEs (modems) are required. Only one operator console is active at a given time. The active console is selected by a switch on the 3725 mdl 1 control panel. See "Service Requirements" for additional information.



**Note:** The numeric suffixes indicate positions; e.g., LAB-3 means LAB in position 3. LAB-1 and LAB-2 are standard in the base 3725.

\* exclusive  
\*\* exclusive

**Position Numbering:** Channel Adapter and LAB positions are numbered sequentially through both the 3725 and the 3726. Thus, Channel Adapter positions 1 and 2 are in the 3725 and Channel Adapter positions 3 through 6 are in the 3726. Similarly LAB positions 1, 2 and 3 are in the 3725 and LAB positions 4 through 8 are in the 3726. See figure above.

**Customer Responsibilities:** See M2700 pages. Also see EP and NCP Programming pages for attachment capability.

**Communications Facilities:** The 3725 operates over PTT -provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

**Remote Communication Controller:** The 3725 can be used without channel connection to a host processor. Such a 3725 is termed "link-attached" and is connected via one or more communication links to channel-attached 3705s and/or 3725s. A link-attached controller has the same networking capabilities as a channel-attached one. Link attachment is a standard capability of the 3725; no special feature is needed.

For more information on the functions of a link-attached Communication Controller, see the Advanced Communications Functions for NCP (ACF/NCP) in the Program Products section.

**Service Requirements:** The 3725 requires a local (primary) 3727 Operator Console as the console for operation, as well as for installation and maintenance. Maximum distance is 7.5m (25 ft).

The 7427 Console Switching Unit (Special Product provided by RPO 8J5008) offers the capability to allow up to four 3725 machines to share a single primary operator console.

Service limitations are: A primary console is required for maintenance and must be available whenever service is to be performed. There must be no obstructing wall or door between the primary console and any attached 3725. The primary console must be available for maintenance personnel when called for servicing a 3725 or 3726.

## Data Communication Equipment

**Modems:** The following IBM modems or units may be used with the 3725:

Modem (models)	Speed (bps)	Lines
3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1/2	2400/1200	Nonswitched or switched voice grade
3864-1/2	4800/2400	Nonswitched or switched voice grade
3865-1/2	9600/4800	Nonswitched voice grade
3868-1	2400/1200	Nonswitched voice grade
3868-2	4800/2400	Nonswitched voice grade
3868-3/4	9600/4800	Nonswitched voice grade
3872-1	2400/1200	Nonswitched or switched voice grade
5811-10	2400/4800/9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400/4800/7200/9600	Nonswitched baseband
5811-28		Rack mount version of 5811-20
5812-10	2400/4800/7200/9600	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-2/3	9600/7200/	Nonswitched

5866-2/3	4800 14400/9600	voice grade Nonswitched voice grade
5868-52		Rack mount version of 5865-2
5868-62		Rack mount version of 5866-1/2

**Note:** 4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**PTT Mandatory DCEs:** The 3725 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110 and the relevant CCITT Recommendations for data transmission speed. The 3725 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.35 and ISO Standard 2593.

**Public Data Networks:** Public Data Networks are attached as listed in the charts of the M2700 pages.

**Non-IBM DCEs:** Non-IBM DCEs, complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35 or X.21, may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin.

**Automatic Calling Equipment:** The 3725 attaches the PTT-mandatory autocal equipment complying with CCITT Recommendation V.25 and ISO Standard 2110.

OEM automatic calling equipment, which comply with EIA RS-366 or CCITT Recommendation V.25, may be attached under the provisions of the IBM Multiple Supplier Systems Policy.

## Configuring and Ordering Procedures:

### • For a new machine:

A new machine must be configured with the aid of the HONE Configurator CF3725, or the "Manual Configuration Guide", SA33-0012. Either procedure yields a list of feature codes and specify codes, which is used to order the machine, and a pictorial diagram showing the positions of the LABs, LICs and ICCs. A copy of this diagram should be given to the customer, as it will be needed when the NCP or EP is generated. At order confirmation time, the machine configuration must be verified by the configurator CF3725. A copy of the CF3725 output must be given to CE, as it will be needed to order and install the DCE and other communication cables.

Approximately 30 days before the machine is to be shipped, the plant will send a similar pictorial diagram to the branch office. It will include two more copies of this diagram with the machine documentation. One of these should be given to the customer, the other to CE.

A similar pictorial diagram, called the Graphic Configuration File, is stored on the MOSS diskette. Most of this file is generated by the 3725, but the customer is responsible for adding the LIC weights (see Transmission Subsystem for description of LIC weights) and for keeping them up to date when line protocols or speeds are changed. This information is required for subsequent MES orders.

A 3727 console must be ordered for each 3725, unless the 3725 is to share a console via the 7427 Console Switching Unit (RPO 8J5008).

### • For an MES:

From the Graphic Configuration file stored on the MOSS diskette, a diagram of the actual machine configuration is obtained on the host printer. The HONE Configurator or the Configurator Guide and this diagram of the machine may be used to configure the MES. This procedure yields a list of feature codes and specify codes (including LIC weights), which is used to order the MES, and an updated pictorial diagram of the LABs, LICs and ICCs. A copy of the updated con-

figuration on the Graphic Configuration printout, marked with the MES order number, must be sent by the marketing representative to the servicing branch office for use by the CE detailing plugging information for installation planning purposes. This updated configuration is required by the CE as it provides the only source of internal machine feature location and plugging information for the LICs and ICCs.

To assist the customer and CE the MES number for the ordered LICs and ICCs as well as the LIC types and weights should be entered in the Graphic Configuration File when the MES is ordered. After installation of the MES, the CE verifies that the LICs and their weights in the Graphic Configuration File are consistent with the installation.

If LIC weight Specify Codes are not specified or if their combined weight exceeds standard initial order limits, then the Specify Code #6000 must be specified unless it is already on the machine history.

To relocate LICs or ICC within the same frame of a leased machine or to change the speed setting of an Internal Clock Control, submit a Record-Purpose-Only MES order with specify #5000.

To relocate LICs or ICC from one leased machine to another leased machine, concurrently submit a MES order for each machine. Specify #5000 on any order which contains reinstallations to avoid shipment of new material. A CE will perform the service, as per request from their sales office and by guidance from MES installation instruction in the Machine Installation Manual (MIM) Vol A03, Chapter 8, for instructions. Since specify code #5000 causes all LICs and ICCs on an order to be shipped as documents only, any feature additions should be ordered on a separate order.

Relocation of Line Attachment Bases, Channel Adapters, Two Processor Switches, Line Feature Increase, or Storage Increment are not possible.

On purchased machines, use RPQs for LIC or ICC relocation on the same machine, for LIC or ICC reinstallation on another machine, or for change of speed of an ICC.

• For cables:

External cables, except the cable for the primary console, are ordered via WTAAS or cable order form. Cables for the 3726 Communication Controller Expansion must be ordered with the 3726. (Canada, Latin America, Taiwan) IBM supplies LIC cables and alternate console cable at standard length, 13.5m (45 feet) long, except for direct-attached DTEs on LIC4A, LIC4B where the standard length is 30m (100 feet): order the corresponding cable group as defined in the IMPP. IBM supplies TIC cables at standard length, 23m (75 ft.): order the corresponding cable group as defined in the IMPP. For shorter cables, or for the alternate operator console cable up to 20m (64 feet) long or for channel cables, order the corresponding cable group at the specified length as defined in the IMPP. For longer cables, order cables by P/Ns, which are listed in the IM-PP (GC22-7064), at the specified length on (<) (Except Canada) an MES. (<) (Canada only) a cable order Form 2642. (<) These cables include installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the (Except Canada) QSLM file (<) (Canada only) parts price list (<) for prices. (except Canada, Latin America, Taiwan) Order all cables by cable group number as shown under "3725/3726 Custom Length Cables" in the IMPP and as listed in the following table:

Regular Order

Related Feature Code	Cable Grp #	Max Lngth m(ft)	Purpose
1561(CA)	3920	62.0	
or		(200)	
8320(TPS)	1178	45.0	CHANNEL
4911		(150)	
(LIC1)	0081	13.5	Power Control
		(45)	V.24 DCE,

3725 Communication Controller

0093	13.5	NTT
	(45)	V.25 ACU,
0683	13.5	NTT
	(45)	V.24 Direct
0690	13.5	Att. ASYNC
	(45)	V.24 Direct
		Att. SYNC
4921	10.6	
(LIC2)	(35)	V.24 DCE
4931	10.6	Wideband
(LIC3)	(35)	Modem
0685	10.6	V.35 DCE
	(35)	
0686	13.5	V.35 Direct
	(45)	Att.
4941	13.5	
	(45)	X.21 DCE
(LIC4A)	30.0	X.21 Direct
	(100)	X.21 Att.
4942	13.5	
(LIC4B)	(45)	X.21 DCE
0688	30.0	X.21 Direct
	(100)	Att.
4991	23	Token-Ring
(TIC1)	(75)	Att.
3727	20.0	Alt.
Console	(64)	Console(<)

The primary operator console is installed with an attachment cable of 7.5m (25 ft) maximum, which is included in the shipping group of the 3725. For the Alternate Operator Console, IBM supplies a cable of up to 20m (65 ft). This cable is obtained by ordering cable group #0099. Additional length up to 150m (490 ft) may be ordered by RPQ.

**Channel Adapters:** The 3725/3726 Channel Adapter attaches to a host channel to provide communications with S/370 (except mdls 115 and 125), 303X, 308X, 43XX, 9370 Processors.

A Two-Processor Switch allows a Channel Adapter to be connected to two processor channels instead of one. The channels may belong to the same or different processors. Data transfers occur on only one channel interface at a time. Manual switches on the 3725 control panel allow the user to enable both channel interfaces, one interface or the other, or neither interface. In the case where both interfaces are enabled, the processors are responsible for resolving any contention, since only one interface can transfer data at a time. In this mode the TPS provides functions comparable to the 3705 CA Type 3.

The Channel Adapters must occupy contiguous positions beginning with position 1. This means that two Channel Adapters must be installed in the 3725 before any may be installed in the 3726. A Two-Processor Switch will always be installed in the first available position.

**Transmission Subsystem (TSS):** The Transmission Subsystem consists of Line Attachment Bases (LABs), Line Interface Couplers and Internal Clock Controls. Four types of LABs are available: LABs Type A, LABs Type B, LABs Type C and CLABs. LABs Type A and CLABs provide one communication scanner and LABs Type B provide two communication scanners. LABs Type C provide one communication scanner and interface clock control and one Token-Ring Multiplexer. Two CLABs are included in the base machine. They are not provided as optional features. Optionally an additional LAB of either Type A or B or C may be installed in the 3725.

The microprocessor based communication scanner serializes and de-serializes the data, supports various line protocols and provides character buffering and cycle steal transfer into the 3725 main storage. The scanner supports BSC (EBCDIC, ASCII) and SDLC in normal mode or block mode; i.e., in a mode of operation similar to

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the one of Scanner Type 3 of the 3705. Asynchronous protocols with 5 to 8 data bits and 1 to 2 stop bits are supported in "character mode" with EP/3725 R1 and ACF/NCP V2; i.e., in a mode of operation similar to the one of Scanner Type 2 of the 3705. They are also supported in "enhanced mode" with EP/3725 R2 and ACF/NCP V3 or V4. BSC tributary operation (EP or PEP) is supported in "character mode" at speeds up to 1200 bps with EP/3725 R1. It is also supported in normal mode at speeds up to 64K bps with EP/3725 R2. In addition, the scanner supports procedures for automatic calling units and X.21 native, X.21bis and X.20bis. It handles a variable number of lines depending on the protocol and the transmission speed.

Line Interface Couplers (LIC) provide the functions necessary to attach the external communications facilities and Data Terminal Equipment (DTEs). DTEs are attached to the 3725 either directly or via DCEs. The type of LIC to use depends on the physical interface presented by the DCE, not on the protocol transmitted through the port. For example, provided that the corresponding software is available in the 3725, X.25 packet, switching may be supported through LIC Type 1, LIC Type 3, LIC Type 4A or LIC Type 4B, whichever is matching the physical interface presented by the X.25 network. According to its type a LIC attaches one or up to four duplex or half-duplex lines. Up to 4 LICs can be installed on a Line and Token-Ring Attachment Base (LAB Type C) for a maximum of 16 lines per LAB Type C. Up to 8 LICs can be installed on LABs Type A or B and CLABs for a maximum of 32 lines per Lab.

Each LIC is assigned a scanner "weight", which is the percentage of scanner capacity consumed by the lines attached to that LIC. This weight depends upon the speeds and protocols of the lines. The specific values for each case are given in Tables 1 through 4B. The total load put on a scanner must not exceed 100 percent. To build the machine correctly, the plant must know the weights of the ordered LICs. These weights are conveyed to the plant by including the corresponding specify codes in the order.

Refer to the "3725 Configuration Guide", SA33-0012, for detailed explanations of the configuration rules used on the TSS.

Internal Clock Control features are required to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly attached synchronous terminals.

**Direct Attachment:** The 3725 allows direct, i.e., modemless, attachment of Data Terminal Equipment (DTE) using LIC-1, LIC-3, LIC-4A or LIC-4B and the corresponding direct attachment cable. LIC-1 attaches devices using asynchronous (start/stop) protocols or devices using synchronous protocols (BSC or SDLC) at speeds up to 19.2K bps. LIC-3 attaches devices using BSC and SDLC protocols at speeds up to 245K bps. LIC-4A attaches devices using SDLC protocols at speeds up to 9600 bps. LIC-4B attaches devices using SDLC protocols at speeds up to 56K bps.

Directly-attached DTEs require the ICC feature in the 3725. At speeds of up to 1200 bps, the speed is set at the time of control program generation and must match that of the DTEs internal clock. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3725) and the speed is set by hardware in the 3725. At the plant, the speed will be set to 9600 bps. At installation time, it may be changed by the CE on a per-LIC basis to 2400, 4800, 19.2K or 56K, or 245K bps. See ICC-2 (#4667) for details.

For information on the available direct attachment cable types and lengths, refer to the "Installation Manual-Physical Planning", GC22-7064.

**Token-Ring Subsystem (TRSS):** It allows 3725 to attach to IBM Token-Ring Networks. It consists of Line and Token-Ring Attachment Bases (LABs), Token-Ring Interface Couplers (TICs). One type of LAB is available: Lab Type C provides one Token-Ring Multiplexer (TRM) and up to four Token-Ring Interface Couplers (TICs). In addition LAB Type C provides one communication scanner and internal clock control and up to four LICs (refer to TSS section).

The TRM provides adaptation between the 3725 and the TICs.

The Token-Ring Interface Coupler Type 1 (TIC) is a set of components and a micro-processor running under control of a resident

microcode which controls the IBM Token-Ring Network using standard protocols. The TIC operates under control of the Network Control Program (NCP) only.

**Performance:** The maximum number of LICs or TICs capable of concurrent operation is a function of line speed, line protocols, the 3725 control program, traffic, and application work load. The number of LICs and TICs which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in customer's situation. The HONE Configurator CF3725 should be used to perform such an analysis.

**Bibliography:** GC20-0001

## SPECIFY

The voltage, nomenclature and color specify codes are not recommended for field installation. Specify codes may not be necessary to order a 3725, if the default options specified below are satisfactory.

- Power (AC, 1-phase, 3-wire):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Color: The standard color is pearl white. (Except Canada>The standard color is blue.<) For other colors, specify #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue (Except Canada>, #9064 for charcoal brown, #9065 for (<) pebble gray (Canada only>, #9066 for pearl white.<)

- Machine Nomenclature: Default is English US.

Canadian French	#2935
English US	#2924
Japanese	#2930
Portuguese	#2933
Spanish	#2931

National safety regulations require maintenance labels in local language. The language is determined by default from the 3-digit country code in the machine order. If the installation country is different from the order country, specify #2900, which provides sets of labels in other languages. The CE selects and installs the appropriate one.

Specify #9710 every time an expansion frame 3726 is ordered with a LAB Type C (#4774) or an MES for a LAB Type C (#4774) is ordered for a 3726. Specify #9710 will trigger the shipment of EC 342076 if not already installed on 3725-1.

## SPECIAL FEATURES

### Non-Communications Features

**Storage Increment 256K (#7100):** Provides main storage increments of 256K bytes to allow up to three megabytes of memory. Maximum: Ten per 3725. Prerequisites: For over two megabytes (7th #7100), specify #9705 on initial order or on MES order if EC A20965 is installed; otherwise, order RPQ 8Q0455 Basic storage upgrade, and one RPQ 8Q0459 Storage increment upgrade for each of the first two storage increments (#7100) which will have been installed prior to the installation of this MES. Also, for over two megabytes (7th #7100), order #7101 3 Meg. storage capability. Field Installation: Yes.

**3 Meg. Storage Capability (#7101):** Provides 3 megabyte main storage capability. Field Installation: Yes.

**RPQ 8Q0455 Basic Storage Upgrade:** Provides upgrade of basic 512K storage on machines without EC A20965. Field Installation Only: Cannot be removed.

**RPQ 8Q0459 Storage Increment Upgrade:** Provides upgrade of one storage increment (1st or 2nd #7100) on machines without EC A20965. Field Installation Only: Cannot be removed. All storage increments (#7100) can be removed.

**Two-Processor Switch (#8320):** Provides a second channel interface to attach CA #1561 to a Multiprocessor System (MP) or to two channels of the same or different processors. One or both channel interfaces are enabled by a manual switch on the 3725 control panel. The enabled channel interface is operational when selected by the host channel. Data transfer cannot occur concurrently on both channel interfaces. Order channel cable groups #3920 and #1178 with this feature. Maximum: Two per 3725. Prerequisites: #1561 in the corresponding position. Field Installation: Yes.

## Communications Features

**Channel Adapter (#1561):** Provides the logical and physical interface between a 3725 and a S/370 (except mdls 115 and 125), 303X, 308X, 43XX, 9370 processor. It attaches to a byte multiplexer, block multiplexer or selector channel. Each one may be equipped with a Two-Processor Switch (TPS). With this feature, order channel cable groups #3920 and, if required, #1178. Maximum: Two per 3725. The possible combinations of CAs and TPSs are:

Number of CAs	CA Position	TPS Position
0	-	-
1	1	1
2	1,2	1,2

Prerequisites: None. Field Installation: Yes.

**Internal Clock Control (#4666):** (Not available after July 1, 1985. Replaced by ICC-2, feature code #4667.) Provides bit clocking when the attached external DCE does not provide this clocking, or when direct attachment of the DTE is required. It provides clocking for eight LICs (up to 32 lines) at 50, 110, 134.5, 200, 300, 600 and 1200 bps for operation with or without a DCE and at speeds of 2400, 4800, 9600, 19K and 56K bps for operation without a DCE (direct attachment). At speeds up to 1200 bps, the speed is set at the time of control program generation and must match that of the internal clock of the attached DTE. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3725) and the speed is set by hardware in the 3725. At the plant, the speed will be set to 9600 bps. At installation time, it may be changed by the CE on a per LIC basis to 2400, 4800, 19K or 56K bps. Maximum: Two per base machine plus one per LAB Type A or Type B. Field Installation: Yes.

**Internal Clock Control Type 2 (#4667):** For internally clocked DTEs, the ICC-2 provides business machine clocking to the 3725, at data rates of 50, 110, 134.5, 200, 300, 600, and 1200 bps for asynchronous (S/S) or synchronous (BSC or SDLC) operation with or without a DCE (direct attachment). It also provides business machine clocking to the 3725, at data rates of 75, 100, 2400, 4800, 9600, and 19.2K bps for asynchronous (S/S) operation with or without a DCE (direct attachment). The speed of the ICC-2 is set, for each DTE, at generation time of the control program and must match that of the internal clock of the attached DTE.

For externally clocked DTEs, it provides bit clocking to directly attached DTE at data rates of 2400, 4800, 9600, 19.2K, 56K, and 245K bps for synchronous (BSC or SDLC) operation without a DCE and at a data rate of 2400, 4800, 9600, and 19.2K bps for start/stop operation without a DCE. The selected speed is set by hardware in the 3725. At the plant, the speed is set to 9600 bps and at installation time, it may be changed by the CE on a per LIC basis. Maximum: Two per base machine plus one per LAB Type A (#4771) or Type B (#4772). Field Installation: Yes.

**Line Attachment Base Type A (#4771):** Provides a communication scanner and a physical base for up to eight LICs Type 1 (#4911) or Type 4A (#4941). Limitations: The sum of LIC weights must not ex-

ceed 100. Except by MES, only LICs with weight 12 or 18 may be installed on the LAB Type A. Exclusive with LAB Type B (#4772) or with LAB Type C (#4774). Maximum: One per 3725. Prerequisites: Specify #9671 only to order a LAB Type A without any associated LIC. Field Installation: Yes.

**Line Attachment Base Type B (#4772):** Provides two communication scanners and a physical base for up to eight LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942). Each scanner controls up to four LICs. Limitations: The sum of the four LIC weights attached to one communication scanner must not exceed 100. Exclusive with LAB Type A (#4771) or with LAB Type C (#4774). Maximum: One per 3725. Prerequisites: Specify #9672 only to order a LAB Type B without any associated LIC. Field Installation: Yes.

**Token-Ring and Line Attachment Base Type C (#4774):** Lab Type C provides a communication scanner, a Token-Ring Multiplexer, an internal clock control, a physical base for up to four LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942), and for up to four Token-Ring Interface Couplers (#4991). Limitations: The sum of the four LIC weights attached to the scanner must not exceed 100. Exclusive with LAB Type A (#4771) or LAB Type B (#4772). Maximum: One per 3725. Prerequisites: Use ordering procedures of specified configurations Specify Code #6000. Specify #9674 only to order a LAB Type C without any associated LIC and TIC. For MES use Specify Code #6000 if it is not already on the machine history. Field Installation: Yes.

**Line Interface Coupler Type 1 (#4911):** Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. LIC Type 1 provides direct (modemless) attachment of synchronous DTEs and of start stop DTEs up to 19.2K bps if it is associated with an ICC. The DTEs attached directly to a given LIC must operate at the same speed.

LIC 1 provides modem attachment of asynchronous devices (not clocked by the DCE) at speeds up to 19.2K bps, if it is associated with an ICC. The asynchronous DTEs using DCE clocking can also be attached at speeds above 1200 bps and up to 19.2K bps, without associated ICC.

Depending on the options chosen at the generation of the control program, each port of LIC Type 1 can support one of the following interfaces:

Duplex or half-duplex EIA RS 232/CCITT V.24 at speeds up to 19.2K bps EIA RS-366/CCITT V.25 Autocall Equipment  
X.21bis  
X.20bis

**Cables:** For each LIC type 1, four cables for DCE, autocall equipment and/or direct attachment must be ordered. Order cable group #1404 for DCE attachment, or cable group #0081 for attachment to NTT DCEs, cable group #0082 for attachment to automatic calling units or cable group #0093 for attachment to NTT automatic calling units, cable group #0085 for V.24/RS-232-C direct attachment asynchronous, or cable group #1400 for V.24/RS-232-C direct attachment synchronous.

**EIA RS-232-C/CCITT V.24 Interface Modem Attachment:** The LIC Type 1 (#4911) can support a cable length of up to 100 meters when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 35 meters (115 feet) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications. To connect a cable longer than 35 meters (115 feet), the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier: A 3863 or 3864 or 3865 modem which does not have Data Multiplexer #3260 installed must have EC 344120 installed -- a 3865 modem with Data Multiplexer #3260 installed must have EC 323406 installed.

## MACHINES

3. Order the cable: See "Ordering Procedures".

Limitations: If the transmission speed of any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is 5 at up to 14400 bps and 4 at up to 19200 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: 16 per basic 3725, plus eight additional per LAB Type A (#4771) or Type B (#4772). Prerequisites: LAB Type A (#4771) or Type B (#4772) in LAB position 3. An ICC on the same LAB, if direct attachment is required or if DCE does not provide clocking. Specify: LIC weights in accordance with Table 1. Field Installation: Yes.

Table 1: LIC Type 1 Weight Specify Codes

Line Cntrl	Trans. Speed (bps) LT/EQ	LIC Weight	-Specify No ICC req'd	Code- ICC req'd
- ACF/NCP 3725 or EP/3725, except EP/3725 R1 for BSC tributary operation				
AUTOCALL	N/A	12	#9101	N/A
BSC EBCDIC	9600	12	#9101	#9121
ASCII	4800			
BSC EBCDIC	14400	25***	#9105	N/A
EBCDIC	14400	20****	#9108	N/A
BSC EBCDIC	19200	25	#9105	#9125
ASCII	9600	25	#9102	#9122
BSC ASCII	14400	37	#9106	N/A
BSC ASCII	19200	50	#9103	#9123
SDLC HDX	9600	12	#9101	#9121
DX	4800			
SDLC HDX	14400	25***	#9105	N/A
HDX	14400	20****	#9108	N/A
SDLC HDX	19200	25	#9105	#9125
DX	9600	25	#9102	#9122
SDLC DX	14400	42	#9107	N/A
SDLC DX	19200	50	#9103	#9123
- EP/3725 R1, for BSC tributary operation				
Ch Mode	1200	42	N/A	#9113

- ACF/NCP 3725 and EP/3725, except ACF/NCP V2 and EP/3725 R1. (Speeds above 1200 bps are supported only for externally clocked DTEs.)

S/S(*)	1200(1)	12	#9101	#9121
	2400(1)	25	#9102	#9122
	4800(1)	50	#9103	#9123
	9600(1)	100	#9104	#9124
	14400**	100	#9104	N/A
	19200**	100	#9104	#9124

- ACF/NCP V2 and EP/3725 R1

S/S	300	12	N/A	#9121
Ch Mode	600	18	N/A	#9111
	1200	37	N/A	#9112

\* Weights and specify codes apply to most commonly used DTEs; i.e., those DTEs using transmission codes with at least 10 bits per character (start, data/parity, stop(s)), like ASCII. DTEs using transmission codes with less than 10 bits per character (start, data/parity, stop(s)), are also supported at speeds up to 600 bps.

\*\* At 14400 and 19200 bps only two ports of the LIC 1 may be used.

\*\*\* Former weight 25 and #9105 remain available upon request.

\*\*\*\* Prerequisite #6000.

**Line Interface Coupler Type 2 (#4921):** Provides attachment for one communication line at speeds up to 230.4K bps. LIC Type 2 supports either duplex or half-duplex data transmission. It has a digital interface for attachment to a nonswitched "wideband" Type 8751, 8801 or 8803 Service. Cables: For each LIC type 2 order one cable group #0086. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths. Limitations: When an LIC Type 2 is installed on a communication scanner, the maximum number of LICs for that scanner is 4 at up to 72000 bps and 2 at up to 128000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per basic 3725, plus eight additional per LAB Type B (#4772) or four additional per LAB Type C (#4774). Prerequisites: LAB Type B (#4772) or LAB Type C (#4774) for LICs in LAB position 3. Specify: LIC weights in accordance with Table 2. Field Installation: Yes.

Table 2: LIC Type 2 Weight Specify Codes

Line Control	Trans. Speed (bps) LT/EQ	LIC Weight	Specify Code
BSC EBCDIC	64000	25	#9201
(See Note) ASCII	64000		
ASCII	64000	42	#9202
SDLC HDX	72000	25	#9201
DX	64000		
DX	64000	42*	#9202
HDX	128000	50**	#9204
DX	128000		
HDX	230400	100	#9203
DX	230400		

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, "BSC Char. Mode").

\* Former weight 42 and specify code #9202 remain available upon request.

\*\* Prerequisite #6000.

**Line Interface Coupler Type 3 (#4931):** Provides attachment for one nonswitched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half-duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 245K bps, if it is associated with an ICC. Cables: For each LIC Type 3, order one cable group #0087 for DCE attachment or cable group #0088 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: When an LIC Type 3 is installed on a communication scanner, the maximum number of LICs for that scanner is 4 at up to 72000 bps and 2 at up to 128000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per basic 3725, plus eight additional per LAB Type B (#4772) or four

additional per LAB Type C (#4774). Prerequisites: LAB Type B (#4772) or LAB Type C (#4774) for LICs in LAB position 3. An ICC on the same LAB, if direct attachment is required. Specify: LIC weights in accordance with Table 3. Field Installation: Yes.

Table 3: LIC Type 3 Weight Specify Codes

Line		Trans Speed (bps)	LIC Wei-	-Specify No ICC req'd	Code- ICC req'd
Control		LT/EQ	ght		
BSC	EBCDIC (See Note)	64000	25	#9301	#9321
	ASCII	64000			
	ASCII	64000	42*	#9302	#9322
SDLC	HDX	72000	25	#9301	#9321
	DX	64000			
	DX	64000	42*	#9302	#9322
	HDX	128000	50**	#9305	N/A
	DX	128000			
	HDX	256000	100	#9303	#9323
	DX	256000			

**Note:** Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, BSC "Char. Mode").

\* Former weight 42 and specify codes #9302 and #9322 remain available upon request.

\*\* Prerequisite #6000.

**Line Interface Coupler Type 4A (#4941):** Provides four CCITT X.21 interfaces as defined in GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and nonswitched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps, if it is associated with an ICC. The DTEs directly attached to the same LIC must operate at the same speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400 or 4800 bps in the field. Cables: For each LIC Type 4A, four cables for DCE and/or direct attachment must be ordered. Order cable group #0089 for DCE attachment or cable group #0091 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. If any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is 4. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: 16 per basic 3725, plus eight additional per LAB Type A (#4771) or Type B (#4772). Prerequisites: LAB Type A (#4771) or Type B (#4772) for LICs in LAB position 3. An ICC on the same LAB, if direct attachment is required. Specify: LIC weights in accordance with Table 4A. Field Installation: Yes.

Table 4A: LIC Type 4A Weight Specify Codes

Line		Trans Speed (bps)	LIC Wei-	-Specify No ICC req'd	Code- ICC req'd
Control		LT/EQ	ght		
SDLC	HDX	9600	12	#9401	#9421
	DX	4800			
	DX	9600	25	#9402	#9422

**Line Interface Coupler Type 4B (#4942):** Provides one CCITT X.21 interface as defined in GA27-3287 for a communication line operating at speeds up to 256K bps. Switched operation is supported up to 48K bps. Nonswitched operation is supported at up to 256K bps. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 245K bps, if it is associated with an ICC. Cables: For each LIC Type 4B, order one cable group #0089 for DCE attachment or one cable group

#0091 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. When an LIC Type 4B is installed on a communication scanner, the maximum number of LICs for that scanner is 4 at up to 72000 bps and 2 at up to 128000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per basic 3725, plus eight additional per LAB Type B (#4772) or four additional per LAB Type C (#4774). Prerequisites: LAB Type B (#4772) or LAB Type C (#4774) for LICs in LAB position 3. An ICC on the same LAB, if direct attachment is required. Specify: LIC weights in accordance with Table 4B. Field Installation: Yes.

Table 4B: LIC Type 4B Weight Specify Codes

Line		Trans Speed (bps)	LIC Wei-	-Specify No ICC req'd	Code- ICC req'd
Control		LT/EQ	ght		
SDLC	HDX	72000	25	#9403	#9423
	DX	64000			
	DX	64000	42*	#9404	#9424
	HDX	128000	50**	#9406	N/A
	DX	128000			

\* Former weight 42 and specify codes #9404 and #9424 remain available upon request.

\*\* Prerequisite #6000.

**Token-Ring Interface Coupler Type 1 (TIC) (#4991):** Provides one attachment to IBM Token-Ring Network. Cables: For each TIC, order one cable group #1666. When a 3725 is to be installed in an IBM Token-Ring Network where IBM Cabling System Type 3 Specified Media (telephone twisted pair) is used, a Data Grade Media to Type 3 Filter is required between the 3725 TIC cable and the telephone twisted pair wiring. Refer to IBM Token-Ring Network Twisted Pair Media Guide (GA27-3714). Refer to the "Installation Manual-Physical Planning", GC22-7064 for information on available cable lengths. Maximum: Four. Prerequisites: LAB Type C (#4774). Field Installation: Yes.

## Configuring and Ordering Procedures of Specified Configurations:

### General:

- It is possible to configure a 3725 without following all the rules described in the "IBM 3725 Communication Controller Configuration Guide", (Chapter "Graphic Configuration Procedure").
- This configuring procedure allows flexibility in placing Line Interface Couplers (LICs) and Internal Clock Control (ICCs) in the 3725 and should only apply to match to match very specific configuration requirements.
- Such configurations are called: "Specified Configurations" and should be ordered with Specify Code #6000.
- Use of Specified Configurations results in bypassing some of the standard configuring rules. Therefore, use of the CF3725 HONE Configurator is required at order entry, order alteration or MES entry time to validate all specified configurations and any subsequent modifications to ensure they meet the mandatory configuring rules.
- For configuring information, refer to the "IBM 3725 Communication Controller Configuration Guide", appendix "Configuring and ordering specified configurations", and to the HONE Configurator CF3725.

### Ordering Procedure:

- Use CF3725 to configure the 3725 to the customer's requirement.
- Enter the order directly into Specify Code #6000 is required.

**MACHINES**

- Rerun CF3725 to validate the actual configuration 12 weeks before the scheduled ship date.
- Make a copy of the configuration section of CF3725 output showing LAB diagrams. On each page, print or type: date, machine type, Plant Order number, scheduled shipment date, customer name, and customer number. Mail to manufacturing plant, "Order Department".

- Rerun CF3725 each time an order alteration is made and mail the configuration section of the CF3725 output to the manufacturing plant as described above.

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 3725 COMMUNICATION CONTROLLER MODEL 2

### PURPOSE

The 3725 model 2 controls data communications between modem-attached or directly-attached (without a modem) or IBM Token-Ring Network attached terminal devices and one or more directly- or remotely-connected S/370 (except models 115 and 125), 303X, 308X, 3090, 43XX, 9370 host processors, or between two host processors. Remote connection may be via PTT -provided or customer-owned communication facilities. A 3727 console is required for installation, operation and maintenance.

The following is a brief summary of the 3725 Communication Controllers.

Comm. Cont.	Max Lines*	Max Strg.	Host Program	Comm. Cont. Program
3725-1	256	3M	VTAM/TCAM	ACF/NCP-PEP
	256	1M	BTAM	EP
3725-2	80	3M	VTAM/TCAM	ACF/NCP-PEP
	80	1M	BTAM	EP

\* Maximum lines that can physically attach, CF3725 is required to predict actual line attachment capabilities

See individual pages for each Communication Controller for information on additional features.

### MODEL 2

#### Model 2 002

**Prerequisites:** If channel-attached, the 3725 mdl 2 requires a control unit position on a system channel. See processor pages for details.

When attaching to a 4321 or 4331 in EP mode, restrictions are imposed on the number of available subchannels which may be used by the 3725 mdl 2. On the 9370 processors, EP and PEP modes are not supported.

### HIGHLIGHTS

The 3725 mdl 2 is a modular, programmable communication controller, which runs under the control of:

- Either ACF/NCP Version 2 for the 3725 or EP/3725 R1 or both in PEP mode.
- Or ACF/NCP Version 3 or Version 4 or EP/3725 R2 or both in PEP mode. (See Program Products and SCP sections for details.)

Its programmability allows a high degree of flexibility in tailoring a data communications system to the customer's requirements. In addition, it plays an active role in Communications Network Management (CNM) by providing data to the Network Communications Control Facility (NCCF) and the Network Problem Determination Application (NPDA).

The machine structure is simplified by having a small number of features: Five types of line interfaces one storage feature, one type of communication scanner and one type of channel adapter. This allows easy additions and changes to the machine configuration.

The 3725 mdl 2 is field upgradable to 3725 mdl 1.

Characteristics of the 3725 mdl 2 include:

- LSI technology for good RAS characteristics and low power consumption.
- The same internal performance as the 3725 mdl 1.

- Attachment of high-speed lines which use the modulo 128 function of ACF/NCP for INN and BNN links.
- 512K bytes to 3M bytes of main storage by steps of 256K bytes.
- Internal Clock Control included in the base machine and optional in the second and third Line Attachment Base.
- Maintenance and Operator Subsystem (MOSS), a functionally separate processor, facilitates maintenance and problem determination by providing:

- Box error logging
- Alert mechanisms
- Display of machine status
- Diagnostics for the Central Control Unit (CCU), channel adapters, scanners and line interfaces
- Utilities to:
  - ▲ collect microcode dumps and send them to the host for printing
  - ▲ provide actual configuration data, help the customer to plan for MES, and store this information on the MOSS diskette via the Graphic Configuration File for further console display or update. This information can be transferred to the host where the machine diagram can be printed by ACF/SSP
  - ▲ allow the operator to keep a current Line Description File, providing the physical address, symbolic name, speed, and protocol of each connected line. This file, stored on the MOSS diskette, may be transferred to the host and printed by ACF/SSP.

- Same RAS Characteristics as the 3725 mdl 1:

- Reliability and availability of the 3725 are enhanced by the following elements:

- ▲ Extensive error detection, including storage protection against inadvertent overlays
- ▲ Functional building block design (most adapter errors are contained within a single building block and thus will not take the system down)
- ▲ Error correcting code for the main storage and scanner storage
- ▲ Error by-pass facilities: Microcode re-IPLs, system re-IPLs and dynamic reconfiguration of SNA resources
- ▲ Automatic first-level problem determination with alert messages, which report hardware errors to the network operator and recommend actions
- ▲ Enhanced problem determination aids
- ▲ Automatic power-on when power returns after loss
- ▲ Port Swapping which allows the operator to logically swap a line from a failing port to a spare port without involvement of the host processor.

- Same serviceability as the 3725 mdl 1, including:

- ▲ Many host-independent functions for installation and maintenance
- ▲ Error information logging/retrieval
- ▲ Diagnostics and trouble shooting facilities
- ▲ Concurrent maintenance for MOSS diskette drive and console.

- Same Network Management and Problem Determination as the 3725 mdl 1: Considerable function has been designed into this communication controller to provide maximum availability to the customer. The 3725 MOSS provides problem determination and recovery procedures that are designed to be easily understood and used by the operator e.g.:

- Stand Alone Link Test facility to test an SDLC Communication link attaching another 3725 or 3705, without involvement of a host or a control program.

## MACHINES

- Line Interface Display to monitor at the console the status of most of the control leads on a line interface.

The 3725 supports IBM's CNM (Communications Network Management) direction by sending error related information to the Network Problem Determination Application (NPDA) running in a host processor under the support of the Network Communications Control Facility (NCCF). This enhanced CNM support provides better problem determination in SNA networks. The basic NCP problem determination functions (alerts) are also offered in the non-NPDA environment, but they are not available in EP mode.

- Attachment of up to 80 duplex or half-duplex lines to the 3725 mdl 2. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.

Attachment of up to four separate IBM Token-Ring Networks to the 3725 mdl 2.

- Zero or four channel adapters in the 3725 mdl 2 to connect to the byte multiplexer, block multiplexer or selector channels of host processors.
- Configuration Aids: The HONE Configurator CF3725 and the "Configuration Guide", SA33-0022, are available to IBM representatives to assist in configuring a 3725 mdl 2 to specific network requirements. The CF3725 configurator provides configurations with feature and specify codes, cable lists as well as storage and performance estimates. In CF3725 and in these pages a number of sample configurations are also available for guidance.

**Sample Configurations:** To ease the task of configuring and ordering a 3725 mdl 2, several sample configurations representing popular combinations of lines have been defined here and in CF3725 response files.

Presentation of the sample configurations C1 to C7:

The first column of each table describes the different categories of lines by groups of protocols. Then, each configuration CONF1 to CONF7 provides a combination of those lines and the related feature/specify codes to be ordered.

### 13 LINES 3 LIC Type 1 and 1 LIC Type 3

Line Protocol	Line Speed up to	CONF 1	CONF 2
BSC EBCDIC	64K bps		
SDLC HDX	64K bps		
		1	1
BSC EBCDIC(1)	9600 bps		
SDLC HDX	9600 bps		
S/S(2)	1200 bps		
AUTOCALL		12	8
BSC ASCII(1)	19.2K bps		
SDLC DX	19.2K bps		
S/S(2)	4800 bps		
AUTOCALL		0	4
Configuration to be ordered		1x#4931 3x#4911 1x#9301 3x#9101	1x#4931 3x#4911 1x#9301 1x#9103 2x#9101

### 16 LINES 4 LICs Type 1

Line Speed

Line Protocol up to bps CONF 3 CONF 4 CONF 5

BSC EBCDIC(1)	9600			
SDLC HDX	9600			
S/S(2)	1200			
AUTOCALL		12	8	0
BSC(1)	9600			
SDLC DX	9600			
S/S(2)	2400			
AUTOCALL		0	4	16
BSC(1)	19.2K			
SDLC	19.2K			
S/S(2)	4800			
AUTOCALL		4	4	0
Configuration to be ordered		4x#4911 3x#9101 1x#9103	4x#4911 2x#9101 1x#9102	4x#4911 4x#9102 1x#9103

### 24 LINES 6 LICs Type 1

Line Protocol	Line Speed up to	CONF 6	CONF 7
BSC EBCDIC(1)	9600 bps		
SDLC HDX	9600 bps		
S/S(2)	1200 bps		
AUTOCALL		24	20
BSC(1)	9600 bps		
SDLC DX	9600 bps		
S/S(2)	2400 bps		
AUTOCALL		0	4
Configuration to be ordered		6x#4911 6x#9101	6x#4911 5x#9101 1x#9102

1. Excluding character mode (See Table 1: LIC Type 1).
2. Not supported with control program level prior to ACF/NCP V3 and EP/3725 R2 (See Table 1: LIC Type 1).

**Note:** For each of these sample configurations you must also order:

- The 3725 mdl 2 base machine (select voltage, machine nomenclature, and color from "Specify").
- As many #1561s (channel adapters) as are needed (maximum 4).
- One 3727 Operator Console (separate order).

**Machine Organization:** The 3725 mdl 2 contains:

**Central Control Unit:** Executes instructions to control the communication scanner and the channel adapters. The CCU runs under the control of ACF/NCP, EP/3725 or both in PEP mode.

**Main Storage:** Houses a control program (NCP, EP, PEP) and other program products loaded from the host processor and provides buffers for the data exchanged with the channel adapters and the lines. The base machine includes 512K bytes of storage. The main storage is expandable up to 3M bytes by steps of 256K bytes.

**Maintenance and Operator Subsystem (MOSS):** Provides IPL and utility procedures for the 3725 mdl 2 operator. It includes an independent processor with its microcode, a diskette drive and an attachment for the operator console.

**Transmission Subsystem (TSS):** Provides the physical connection to communication facilities. It consists of Line Attachment Bases (LABs) with a microprocessor based scanner, Line Interface Couplers (LICs), and Internal Clock Control (ICC-2).

The 3725 mdl 2 may also contain:

**Channel Adapters (CAs):** Provide physical connection to host channels. The base machine provides a physical base for two Channel Adapters.

**Line Interface Couplers (LICs):** Provide interfaces to communication lines. The base machine provides a physical base for up to six LICs.

**Internal Clock Control (ICC-2):** Requires to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly attached synchronous terminals.

The 3725 mdl 2 does not attach the 3726.

**Token-Ring Subsystem (TRSS):** Provides the physical connection to IBM Token-Ring Network. It consists of Line and Token-Ring Attachments (LABs) with Token-Ring Multiplexer and Token-Ring Interface Coupler (TICs).

**Console:** The 3725 mdl 2 requires a primary 3727 Operator Console for installation, operation and maintenance; see M3727 pages for details. A second 3727 Operator Console may be used as an alternate operator console. The operator consoles are directly attached, i.e., no DCEs (modems) are required. Only one operator console is active at a given time. The active console is selected by a switch on the 3725 mdl 2 control panel. See "Service Requirements" for additional information.

**Customer Responsibilities:** See M2700 pages. Also see EP and NCP Programming pages for attachment capability.

**Communications Facilities:** The 3725 mdl 2 operates over PTT-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

**Remote Communication Controller:** The 3725 mdl 2 can be used without channel connection to a host processor. Such a 3725 mdl 2 is termed 'link-attached' and is connected via one or more communication links to channel-attached 3705s, 3725 mdl 1s and/or 3725 mdl 2s. A link-attached controller has the same networking capabilities as a channel-attached one. Link attachment is a standard capability of the 3725 mdl 2; no special feature is needed. For more information on the functions of a link-attached Communication Controller, see the Advanced Communications Functions for NCP (ACF/NCP) in the Program Products section.

**Service Requirements:** The 3725 mdl 2 requires a local (primary) 3727 Operator Console as the console for operation, as well as for installation and maintenance. Maximum distance is 7.5m (25 ft). The 7427 Console Switching Unit (Special Product provided by RPQ 8J5008) offers the capability to allow up to four 3725 mdl 2 and/or 3725 mdl 1 machines to share a single primary operator console.

**Service limitations are:** A primary console is required for maintenance and must be available whenever service is to be performed. There must be no obstructing wall or door between the primary console and any attached 3725 mdl 2. The primary console must be available for maintenance personnel when called for servicing a 3725 mdl 2.

## Data Communication Equipment

**Modems:** The following IBM modems or units may be used with the 3725 mdl 2:

Modem (models)	Speed (bps)	Lines
3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1/2	2400/1200	Nonswitched or switched voice grade
3864-1/2	4800/2400	Nonswitched or switched voice grade
3865-1/2	9600/4800	Nonswitched voice grade
3868-1	2400/1200	Nonswitched voice grade
3868-2	4800/2400	Nonswitched voice grade
3868-3/4	9600/4800	Nonswitched voice grade
3872-1	2400/1200	Nonswitched or switched voice grade
5811-10	2400/4800/9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400/4800/7200/9600	Nonswitched baseband
5811-28		Rack mount version of 5811-20
5812-10	2400/4800/7200/9600	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-2/3	9600/7200/4800	Nonswitched voice grade
5866-2/3	14400/9600	Nonswitched voice grade
5868-52		Rack mount version of 5865-2
5868-62		Rack mount version of 5866-1/2

**Note:** 4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**PTT Mandatory DCEs:** The 3725 mdl 2 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110 and the relevant CCITT Recommendations for data transmission speed. The 3725 mdl 2 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.35 and ISO Standard 2593.

**Public Data Networks:** Public Data Networks are attached as listed in the charts of the M2700 pages.

**Non-IBM DCEs:** Non-IBM DCEs complying with EIA RS-232-C, CCITT Recommendations V.24/V.28, V.35 or X.21 may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin.

**Automatic Calling Equipment:** The 3725 mdl 2 attaches the PTT mandatory autocal equipment complying with CCITT Recommendation V.25 and ISO Standard 2110.

OEM automatic calling equipment which comply with EIA RS-366 or CCITT Recommendation V.25 may be attached under the provisions of the IBM Multiple Supplier Systems Policy.

## Configuring and Ordering Procedures:

- For a new machine:: A new machine must be configured with the aid of the HONE Configurator CF3725 or the "Configuration Guide", SA33-0022, unless one of the sample configurations is ordered. Either procedure yields a list of feature codes and specify codes, which is used to order the machine, and a pictorial diagram showing the positions of the LICs. A copy of this diagram should be given to the customer, as it will be needed when the NCP or EP is generated. At order confirmation time, the machine configuration must be verified by the configurator CF3725. A copy of the CF3725 output must be given to CE, as it will be needed to order and install the DCE and other communication cables. Approximately 30 days before the machine is to be shipped, the plant will send a similar pictorial diagram to the branch office. It will include two more copies of this diagram with the machine documentation. One of these should be given to the customer, the other to CE.

A similar pictorial diagram, called the Graphic Configuration File, is stored on the MOSS diskette. Most of this file is generated by the 3725 mdl 2, but the customer is responsible for adding the LIC weights (see "Transmission Subsystem" for description of LIC weights) and for keeping them up to date when line protocols or speeds are changed. This information is required for subsequent MES orders.

A 3727 console must be ordered for each 3725 mdl 2, unless the 3725 mdl 2 is to share a console via the 7427 Console Switching Unit (RPQ 8J5008).

- For an MES:

From the Graphic Configuration file stored on the MOSS diskette, a diagram of the actual machine configuration is obtained on the host printer. The HONE Configurator CF3725 or the Configuration Guide and this diagram of the machine may be used to configure the MES. This procedure yields a list of feature codes and specify codes (including LIC weights), which is used to order the MES, and an updated pictorial diagram of the LICs. A copy of the updated configuration on the Graphic Configuration printout marked with the MES order number must be sent by the marketing representative to the servicing branch office for use by the CE detailing plugging information for installation planning purposes. This updated configuration is required by the CE as it provides the only source of internal machine feature location and plugging information for the LICs.

To assist the customer and CE, the MES number for the ordered LICs, as well as the LIC types and weights, should be entered in the Graphic Configuration File when the MES is ordered. After installation of the MES, the CE verifies that the LICs and their weights in the Graphic Configuration File are consistent with the installation.

If LIC weight specify codes are not specified or if their combined weight exceeds standard initial order limits, then the Specify Code #6000 must be specified unless it is already on the machine history.

To relocate Line Interface Couplers (LICs) or Internal Clock Control (ICC) within the same frame of a leased machine or to change the speed setting of an Internal Clock Control submit a Record-Purpose-Only MES order with specify #5000.

To relocate Line Interface Couplers (LICs) or Internal Clock Control (ICC) from one leased machine to another leased machine, concurrently submit a MES order for each machine and specify #5000 on any order which contains reinstallation to avoid shipment of new material. CE will perform the service as per request from their sales office and by guidance from MES installation instruction in the Machine Installation Manual (MIM) Vol A03 Chapter 8 for instructions. Because specify code #5000 causes all LICs and ICCs on an order to be shipped as documents only, any feature additions should be ordered on a separate order.

Relocation of Channel and Line Attachment Base, Line Attachment Base, Channel adapters, or Storage Increment are not possible. On purchased machines, use RPQs for LIC or

ICC relocation on the same machine, for LIC or ICC reinstallation on another machine, or for change of speed of an ICC.

- For cables:

External cables, except the cable for the primary console, are ordered via WTAAS or cable order form. Cables for the 3726 Communication Controller Expansion must be ordered with the 3726. (Canada, Latin America, Taiwan > IBM supplies LIC cables and alternate console cable at standard length, 13.5m (45 ft) long, except for direct attached DTEs on LIC4A, LIC4B where the standard length is 30m (100 ft): order the corresponding cable group as defined in the IMPP. IBM supplies TIC cables at standard length 23m (75 ft): order the corresponding cable group as defined in the IMPP. For shorter cables, or for the alternate operator console cable up to 20m (64 ft) long or for channel cables, order the corresponding cable group at the specified length as defined in the IMPP. For longer cables, order cables by P/Ns, which are listed in the IM-PP (GC22-7064), at the specified length on (<) (Except Canada > an MES. <) (Canada only > a cable order Form 2642. <) These cables include installation charges. Maintenance charges are included in the associated Line Sets. Inquire into the (Except Canada > QSLM file <) (Canada only > FED parts price list <) for prices. (except Canada, Latin America, Taiwan > Order all cables by cable group number as shown under "3725/3726 Custom Length Cables" in the IMPP and as listed in the following table:

### Regular Order

Rel. Cable Feat. Code	Grp. #	Max. Length m. (ft)	Purpose
1561 (CA) or 8320 (TPS)	3920 62.0 (200) 1178 45.0 (150)		CHANNEL Power Control
4911 (LIC1)	0081 13.5 ( 45) 0093 13.5 ( 45) 0683 13.5 ( 45)		V.24 DCE, NTT V.25 ACU, NTT V.24 Dir.Att.
ASYN	0690 13.5 ( 45)		V.24 Dir.Att.
SYN	0691 10.6 ( 35) 0684 10.6 ( 35)		V.24 DCE Wideband Modem
4921 (LIC2)	0685 10.6 ( 35) 0686 13.5 ( 45)		V.35 DCE V.35 Dir.Att.
4941 (LIC4A)	0687 13.5 ( 45) 0688 30.0 (100)		X.21 DCE X.21 Dir.Att.
4942 (LIC4B)	0687 13.5 ( 45) 0688 30.0 (100)		X.21 DCE X.21 Dir.Att.
4991 (TICs)	1666 23 (75)		Token-Ring Att.
3727 Console	0689 20.0 ( 64)		Alt. Console(<)

The primary operator console is installed with an attachment cable of 7.5m (25 ft) maximum, which is included in the shipping group of the 3725 mdl 2. For the Alternate Operator Console, IBM supplies a cable of up to 20m (65 ft). This cable is obtained by ordering cable group #0099. Additional length up to 150m (490 ft) may be ordered by RPQ.

**Channel Adapters:** The 3725 mdl 2 Channel Adapter attaches to a host channel to provide communications with S/370 (except mdls 115 and 125), 303X, 308X, 43XX, 9370 Processors.

**Transmission Sub-System (TSS):** Provides the physical connection to communication facilities. It consists of Line Attachment Bases

(LABs) with a microprocessor based scanner, Line Interface Couplers (LICs), and Internal Clock Control (ICC-2). Four types of LABs are available: Channel and Line Attachment Base (CLAB), LAB Type A, LAB Type B and Line and Line and Token-Ring Attachment Base (LAB Type C). One CLAB and one ICC-2 is included in the base machine, in option a second CLAB and one LAB Type A or Type B or Type C may be ordered for installation in LAB positions 2 and 3 respectively. The second CLAB provides a physical base for up to six LICs, two Channel Adapters, and one ICC-2. The LAB Type A or Type B provides a physical base for up to eight LICs and one ICC-2. The LAB Type C provides a physical base for up to four LICs and for up to four TICs and includes internal clock control. The second CLAB (#4773), the LAB Type A (#4771) or Type B (#4772), or Type C (#4774), the ICC-2 (#4667) in the second CLAB and in the LAB Type A or B, and the LICs are optional features.

The microprocessor based communication scanner serializes and de-serializes the data, supports various line protocols and provides character buffering and cycle steal transfer into the 3725 mdl 2 main storage. The scanner supports BSC (EBCDIC, ASCII) and SDLC in normal mode or block mode, i.e., in a mode of operation similar to the one of Scanner Type 3 of the 3705. Asynchronous protocols with 5 to 8 data bits and 1 to 2 stop bits are supported in "character mode" with EP/3725 R1 and ACF/NCP V2, i.e. in a mode of operation similar to the one of the Scanner Type 2 of the 3705. They are also supported in "enhanced mode" with EP/3725 R2 and ACF/NCP V3 or V4. BSC tributary operation (EP or PEP) is supported in "character mode" at speeds up to 1200 bps with EP/3725 R1. It is also supported in normal mode at speeds up to 64K bps with EP/3725 R2, for tributary addressing under EP or PEP. In addition the scanner supports procedures for automatic calling units and X.21 native, X.21bis and X.20bis. It handles a variable number of lines depending on the protocol and the transmission speed.

Line Interface Couplers (LIC) provide the functions necessary to attach the external communications facilities and Data Terminal Equipment (DTEs). DTEs are attached to the 3725 mdl 2 either directly or via DCEs. The type of LIC to use depends on the physical interface presented by the DCE, not on the protocol transmitted through the port. For example, provided that the corresponding software is available in the 3725, X.25 packet switching may be supported through LIC Type 1, LIC Type 3, LIC Type 4A or LIC Type 4B, whichever is matching the physical interface presented by the X.25 network. According to its type a LIC attaches one or up to four duplex or half-duplex lines. Up to six LICs on each CLAB and up to eight LICs on the LAB type A or B can be installed in the 3725 mdl 2 to provide a maximum of 80 lines and up to four LICs can be installed on a Line and Token-Ring Attachment Base (LAB Type C) for a maximum of 64 lines per 3725-2.

Each LIC is assigned a scanner 'weight', which is the percentage of scanner capacity consumed by the lines attached to that LIC. This weight depends upon the speeds and protocols of the lines. The specific values for each case are given in Tables 1 through 4B. The total load put on the scanner must not exceed 100 percent. To build the machine correctly, the plant must know the weights of the ordered LICs. These weights are conveyed to the plant by including the corresponding specify codes in the order.

Refer to the "Configuration Guide", SA33-0022, available to IBM representatives, for detailed explanations of the configuration rules used for the TSS.

Internal Clock Control (ICC) is used to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly-attached synchronous terminals.

**Direct Attachment:** The 3725 mdl 2 allows direct, i.e., modemless, attachment of Data Terminal Equipment (DTE) using LIC-1, LIC-3, LIC-4A or LIC-4B and the corresponding direct attachment cable. LIC-1 attaches devices using asynchronous (start/stop) protocols or devices using synchronous protocols (BSC or SDLC) at speeds up to 19.2K bps. LIC-3 attaches devices using BSC and SDLC protocols at speeds up to 245K bps. LIC-4A attaches devices using SDLC protocols at speeds up to 9600 bps. LIC-4B attaches devices using SDLC protocols at speeds up to 245K bps.

Directly-attached DTEs use the ICC. See Internal Clock Control (#4667) for details.

For information on the available direct attachment cable types and lengths, refer to the "Installation Manual-Physical Planning Manual", GC22-7064.

**Token-Ring Subsystem (TRSS):** It allows 3725 to attach to IBM Token-Ring Networks. It consist of a Line and Token-Ring Attachment Base (LAB) and Token-Ring Interface Couplers (TICs). One type of LAB is available: LAB Type C provides one Token-Ring Multiplexer (TRM) and up to Four Token-Ring Interface Couplers (TICs). In addition LAB Type C provides one communication scanner and internal clock control and up to four LICs (refer to TSS section). The TRM provides adaptation between the 3725 and the TICs. The Token-Ring Interface Coupler (TIC) is a set of components and a micro-processor running under control of a resident microcode which controls the IBM Token-Ring Network using standard protocols. The TIC operates under control of the Network Control Program (NCP) only.

**Performance:** The maximum number of LICs or TICs capable of concurrent operation is a function of line speed, line protocols, the 3725 control program, traffic, and application work load. The number of LICs and TICs which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in customer's situation. The HONE Configurator CF3725 should be used to perform such an analysis.

**Publications:** GC20-0001

## SPECIFY

The voltage, nomenclature and color specify codes are not recommended for field installation. Specify codes may not be necessary to order a 3725 mdl 2, if the default options specified below are satisfactory.

- Power (AC, 1-phase, 3-wire):

50Hz	60Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Color: (Except Canada> The standard color is blue.<) For other colors, specify #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, #9066 for pearl white (Canada only)

- Machine Nomenclature: Default is English US.

Canadian Fr.	#2935	Portuguese	#2933
English US	#2924	Spanish	#2931
Japanese	#2930		

National safety regulations require maintenance labels in local language. The language is determined by default from the 3-digit country code in the machine order. If the installation country is different from the order country specify #2900 which provides sets of labels in other languages. The CE selects and installs the appropriate one.

## SPECIAL FEATURES

### Non-Communications Features

**Storage Increment 256K (#7100):** Provides main storage increments of 256K bytes to allow up to three megabytes of memory. Maximum: Ten per 3725. Prerequisites: For over two megabytes (7th #7100), specify #9705 on initial order or on MES order if EC A20965 is installed; otherwise, order RPQ 8Q0455 Basic storage upgrade, and one RPQ 8Q0459 Storage increment upgrade for each of the first two storage increments (#7100) which will have been installed prior to the installation of this MES. Also, for over two megabytes (7th

#7100), order #7101 3 Meg. storage capability. Field Installation: Yes.

**3 Meg. Storage Capability (#7101):** Provides 3 megabyte main storage capability. Field Installation: Yes.

**RPQ 8Q0455 Basic Storage Upgrade:** Provides upgrade of basic 512K storage on machines without EC A20965. Field Installation Only. Cannot be removed.

**RPQ 8Q0459 Storage Increment Upgrade:** Provides upgrade of one storage increment (1st or 2nd #7100) on machines without EC A20965. Field Installation Only. Cannot be removed. All storage increments (#7100) can be removed.

## Communications Features

**Channel Adapter (#1561):** Provides the logical and physical interface between a 3725 mdl 2 and a S/370 (except mdls 115 and 125), 303X, 308X, 4300 processor. It attaches to a byte multiplexer, block multiplexer or selector channel. With this feature, order channel cable group #3920 and, if required, #1178. Maximum: Four per 3725 mdl 2. Prerequisites: A CLAB (#4773) must be installed in position 2 to attach the third and fourth Channel Adapters. Field Installation: Yes.

**Internal Clock Control Type 2 (#4667):** For internally clocked DTEs, the ICC-2 provides business machine clocking to the 3725, at data rates of 50, 110, 134.5, 200, 300, 600, 1200 bps, for asynchronous (S/S) or synchronous (BSC) operation with or without a DCE (direct attachment). It also provides business machine clocking to the 3725, at data rates of 75, 100, 2400, 4800, 9600, and 19.2K bps for asynchronous (S/S) operation with or without a DCE. The speed of the ICC-2 is set, for each DTE, at generation time of the control program and must match that of the internal clock of the attached DTE.

For externally clocked DTEs, it provides bit clocking to a directly attached DTE at data rates of 2400, 4800, 9600, 19.2K, 56K, and 245K bps for synchronous (BSC or SDLC) operation without a DCE and at a data rate of 2400, 4800, 9600, and 19.2K bps for start/stop operation without a DCE. The selection speed is set by hardware in the 3725. At the plant the speed is set to 9600 bps and at installation time it may be changed by the CE on a per LIC basis. Maximum: One in second CLAB (#4773) and one in the LAB Type A (#4771) or Type B (#4772). Field Installation: Yes.

**Channel and Line Attachment Base (#4773):** Provides one communication scanner (ICC-2) and a physical base to optionally attach one Internal Clock Control Type 2 (#4667), up to 2 Channel Adapters (#1561), and up to six LICs. Limitations: The sum of the LIC weight must not exceed 100. The CLAB can only be installed in position two. Maximum: One per 3725. Prerequisite: Specify #9673 only to order a CLAB without any associated LIC. Field Installation: Yes.

**Line Attachment Base Type A (#4771):** Provides one communication scanner and a physical base to optionally attach one Internal Clock Control Type 2 (#4667) and up to eight LICs. Limitations: The sum of the LIC weight must not exceed 100. The LAB Type A can only be installed in the position 3 and is exclusive with the LAB Type B (#4772) or with the LAB Type C (#4774). Maximum: One per 3725. Prerequisites: A CLAB (#4773) should be installed in position 2. Specify #9671 only to order a LAB Type A without any associated LIC. Field Installation: Yes.

**Line Attachment Base Type B (#4772):** Provides two communication scanners and a physical base to optionally attach one Internal Clock Control Type 2 (#4667) and up to eight LICs. Limitations: The sum of the LIC weight must not exceed 100. The LAB Type B can only be installed in the position 3 and is exclusive with the LAB Type A (#4771) or with the LAB Type C (#4774). Maximum: One per 3725. Prerequisites: A CLAB (#4773) should be installed in position 2. Specify #9672 only to order a LAB Type B without any associated LIC. Field Installation: Yes.

**Line and Token-Ring Attachment Base Type C (#4774):** LAB Type C provides a communication scanner, a token-ring multiplexer, an internal clock control, a physical base for up to four LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942), and for up to Four Token-Ring Interface Couplers (#4991).

Limitations: The sum of the four LIC weights attached to the scanner must not exceed 100. LAB Type C can only be installed in LAB position 3 and is exclusive with LAB Type A (#4771) or LAB Type B (#4772). Maximum: One per 3725. Prerequisites: A CLAB (#4773) must be installed in position 2. Use ordering procedures of specified configurations Specify Code #6000. Specify #9674 only to order a LAB Type C without any associated LIC and TIC. For MES use Specify Code #6000 if it is not already on the machine history. Field Installation: Yes.

**Line Interface Coupler Type 1 (#4911):** Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. LIC Type 1 provides direct (modemless) attachment of synchronous DTEs and of start stop DTEs at up to 19.2K bps, if it is associated with an ICC. The DTEs attached directly to a given LIC must operate at the same speed. Depending on the options chosen at the generation of the control program each port of LIC Type 1 can support one of the following interfaces:

- Duplex or half-duplex EIA RS-232/CCITT V.24 at speeds up to 19.2K bps
- EIA RS-366/CCITT V.25 Autocall Equipment
- X.21bis switched or nonswitched
- X.20bis switched or nonswitched

LIC 1 provides modem attachment of asynchronous devices (not checked by the DCE) at a speed up to 19.2K bps, if it is associated with an ICC-2. The asynchronous DTEs using DCE clocking can also be attached at speeds above 1200 bps and up to 19.2K bps, without an associated ICC-2.

**Cables:** For each LIC type 1, four cables for DCE, autocall equipment and/or direct attachment must be ordered. Order cable group #1404 for DCE attachment or cable group #0081 for attachment to NTT DCEs cable group #0082 for attachment to automatic calling units or cable group #0093 for attachment to NTT automatic calling units cable group #0085 for V.24/RS-232-C direct attachment asynchronous or cable group #1400 for V.24/RS-232-C direct attachment, synchronous.

**EIA RS-232-C/CCITT V.24 Interface Modem Attachment:** The LIC Type 1 (#4911) can support a cable length of up to 100m when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 35m (115 ft) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications. To connect a cable longer than 35m (115 ft) the following must be done:

1. Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
2. If the suffix is "DG" or earlier, a 3863 or 3864 or 3865 modem which does not have Data Multiplexer #3260 installed must have EC 344120 installed. A 3865 modem with Data Multiplexer #3260 installed must have EC 323406 installed.
3. Order the cable: See "Ordering Procedure".

Limitations: If the transmission speed of any of the lines connected to the communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is 5 at up to 14400 bps and 4 at up to 19200 bps. Due to the sum of LIC weights the number of LICs may have to be further reduced. Maximum: Six in each of the CLAB plus 8 in the LAB Type A or B. Specify: LIC weights in accordance with Table 1. Field Installation: Yes.

Table 1: LIC Type 1 Weight Specify Codes

Line Control	Trans- mission Speed up to	-Specify Code-		
		LIC Wt.	No ICC req'd	ICC req'd

- ACF/NCP 3725 or EP/3725, except  
EP/3725 R1 for BSC tributary operation

AUTOCALL	N/A	12	#9101	NA
BSC				
EBCDIC	9600	12	#9101	#9121
ASCII	4800			
EBCDIC	14400	25***	#9105	N/A
EBCDIC	14400	20****	#9108	N/A
EBCDIC	19200	25	#9105	#9125
ASCII	9600	25	#9102	#9122
ASCII	14400	37	#9106	N/A
ASCII	19200	50	#9103	#9123
SDLC HDX	9600	12	#9101	#9121
DX	4800			
HDX	14400	25***	#9105	N/A
HDX	14400	20****	#9108	N/A
HDX	19200	25	#9105	#9125
DX	9600	25	#9102	#9122
DX	14400	42	#9107	N/A
DX	19200	50	#9103	#9123

- EP/3725 R1, for BSC tributary operation

Char.Mode 1200 42 N/A #9113

- ACF/NCP 3725 and EP/3725, except ACF/NCP V2 and EP/3725 R1. (Speeds above 1200 bps are supported only for externally clocked DTEs.)

S/S(*)	1200	12	#9101	#9121
	2400	25	#9102	#9122
	4800	50	#9103	#9123
	9600	100	#9104	#9124
	14400**	100	#9104	N/A
	19200**	100	#9104	#9124

- ACF/NCP V2 and EP/3725 R1

S/S	300	12	N/A	#9121
Ch Mode	600	18	N/A	#9111
	1200	37	N/A	#9112

\* Weights and specify codes apply to the most commonly used DTEs, i.e. those DTEs using transmission codes with at least 10 bits per character (start, data/parity, stop(s)), like ASCII. DTEs using transmission codes with less than 10 bits per character (start, data/parity, stop(s)), are also supported at speeds up to 600 bps.

\*\* At 14400 and 19200 bps only two ports of the LIC 1 may be used.

\*\*\* Former weight 25 and #9105 remain available upon request.

\*\*\*\* Prerequisite #6000.

**Line Interface Coupler Type 2 (#4921):** Provides attachment for one communication line at speeds up to 230.4K bps. LIC Type 2 supports either duplex or half-duplex data transmission. It has a digital interface for attachment to a nonswitched "wideband" Type 8751, 8801 or 8803 Service. Cables: For each LIC type 2, order one cable group #0086. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths. Limitations: When an LIC Type 2 is installed on a communication scanner, the maximum number of LICs for that scanner is 4 at up to 72000 bps and 2 at up to 128000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Four in each of the CLAB plus 8 in the LAB Type B. Specify: LIC weights in accordance with Table 2. Field Installation: Yes.

Table 2: LIC Type 2 Weight Specify Codes

Line Control	Trans-mission Speed (bps)	LIC Wt.	Specify Code
	LT/EQ		

BSC				
EBCDIC	64000	25	#9201	
(See Note)				
ASCII	64000			
ASCII	64000	42*	#9202	
SDLC HDX	72000	25	#9201	
DX	64000			
DX	64000	42*	#9202	
HDX	128000	50**	#9204	
DX	128000			
HDX	230400	100	#9203	
DX	230400			

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, "BSC Char. Mode").

\* Former weight 42 and specify code #9202 remain available upon request.

\*\* Prerequisite #6000.

**Line Interface Coupler Type 3 (#4931):** Provides attachment for one nonswitched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half-duplex data transmission. LIC Type 3 provides direct (modeless) attachment at up to 245K bps. Cables: For each LIC Type 3, order one cable group #0087 for DCE attachment or cable group #0088 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: When an LIC Type 3 is installed on a communication scanner, the maximum number of LICs for that scanner is 4 at up to 72000 bps and 2 at up to 128000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Four per basic 3725 mdl 2. Specify: LIC weights in accordance with Table 3. Field Installation: Yes.

Table 3: LIC Type 3 Weight Specify Codes

Line Control	Trans-mission Speed (bps)	LIC Wt.	-Specify Code- No ICC req'd	ICC req'd
	LT/EQ			
BSC				
EBCDIC	64000	25	#9301	#9321
(See Note)				
ASCII	64000			
ASCII	64000	42*	#9302	#9322
SDLC HDX	72000	25	#9301	#9321
DX	64000			
DX	64000	42*	#9302	#9322
HDX	128000	50**	#9305	N/A
DX	128000			
HDX	256000	100	#9303	#9323
DX	256000			

Note: Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC Type 1 BSC "Char. Mode", in Table 1).

\* Former weight 42 and specify codes #9302 and #9322 remain available upon request.

\*\* Prerequisite #6000.

**Line Interface Coupler Type 4A (#4941):** Provides four CCITT X.21 interfaces as defined in GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and nonswitched operations are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modeless) attachment at 2400, 4800 or 9600 bps. The DTEs directly attached to the same LIC must operate at the same speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400 or 4800 bps in the field. Cables: For each LIC Type 4A, four cables for DCE and/or direct attachment must be ordered. Order cable group #0089 for

DCE attachment or cable group #0091 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. If any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Six in each of the CLAB plus 8 in the LAB Type A or B. Specify: LIC weights in accordance with Table 4A. Field Installation: Yes.

**Table 4A: LIC Type 4A Weight Specify Codes**

Line Control		Trans- mission Speed (bps) LT/EQ	LIC Wt.	-Specify Code- No ICC req'd	
				ICC req'd	ICC req'd
SDLC	HDX	9600	12	#9401	#9421
	DX	4800			
	DX	9600	25	#9402	#9422

**Line Interface Coupler Type 4B (#4942):** Provides one CCITT X.21 interface as defined in GA27-3287 for a communication line operating at speeds up to 256K bps. Switched operation is supported up to 48K bps. Nonswitched operation is supported at up to 256K bps. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 245K bps, if it is associated with an ICC. Cables: For each LIC Type 4B, order one cable group #0089 for DCE attachment or one cable group #0091 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. When an LIC Type 4B is installed on a communication scanner, the maximum number of LICs for that scanner is 4 at up to 72000 bps and 2 at up to 128000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Four in each of the CLAB plus 8 in the LAB Type B. Specify: LIC weights in accordance with Table 4B. Field Installation: Yes.

**Table 4B: LIC Type 4B Weight Specify Codes**

Line Control		Trans- mission Speed (bps) LT/EQ	LIC Wt.	-Specify Code- No ICC req'd	
				ICC req'd	ICC req'd
SDLC	HDX	72000	25	#9403	#9423
	DX	64000			
	DX	64000	42*	#9404	#9424
	HDX	128000	50**	#9406	N/A
	DX	128000			

\* Former weight 42 and specify codes #9404 and #9424 remain available upon request.

\*\* Prerequisite #6000.

**Token-Ring Interface Coupler Type 1 (TIC) (#4991):** Provides one attachment to IBM Token-Ring Network. Cables: For each TIC, order one cable group #1666. When the 3725 is to be installed in an IBM Token-Ring Network where IBM Cabling System Type 3 Specified Media (telephone twisted pair) is used a Data Grade Media to Type 3 Filter is required between the 3725 TIC cable and the telephone twisted pair wiring. Refer to "IBM Token-Ring Network Twisted Pair Media Guide", GA27-3714. Refer to the "Installation Manual-Physical Planning", GC22-7064 for information on available cable lengths. Maximum: Four. Prerequisites: LAB Type C (#4774). Field Installation: Yes.

#### Configuring and Ordering Procedures of Specified Configurations:

- General:

- It is possible to configure a 3725 without following all the rules described in the "IBM 3725 Communication Controller Configuration Guide", (Chapter "Graphic Configuration Procedure").
- This configuring procedure allows flexibility in placing Line Interface Couplers (LICs) and Internal Clock Control (ICCs) in the 3725 and should only apply to match to match very specific configuration requirements.
- Such configurations are called: "Specified Configurations" and should be ordered with Specify Code #6000.
- Use of Specified Configurations results in bypassing some of the standard configuring rules. Therefore, use of the CF3725 HONE Configurator is required at order entry, order alteration or MES entry time to validate all specified configurations and any subsequent modifications to ensure they meet the mandatory mandatory configuring rules.
- For configuring information, refer to the "IBM 3725 Communication Controller Configuration Guide", appendix "Configuring and ordering specified configurations", and to the HONE Configurator CF3725.

#### ● Ordering Procedure:

- Use CF3725 to configure the 3725 to the customer's requirement.
- Enter the order directly (Specify Code #6000 is required).
- Rerun CF3725 to validate the actual configuration 12 weeks before the scheduled ship date.
- Make a copy of the configuration section of CF3725 output showing LAB diagrams. On each page, print or type: date, machine type, Plant Order number, scheduled shipment date, customer name, and customer number. Mail to manufacturing plant, "Order Department"
- Rerun CF3725 each time an order alteration is made and mail the configuration section of the CF3725 output to the manufacturing plant as described above.

#### MODEL CONVERSIONS

The following model conversion is field installable: 3725 mdl 2 to 3725 mdl 1. The features already installed in a 3725 mdl 2, except the second CLAB (#4773) and the third and fourth Channel Adapters (#1571) are automatically reinstalled in the 3725 mdl 1 during a model conversion.

The basic ICC will be removed from the 3725 mdl 2 purchased machine. To reinstall ICC, order RPQ 8Q0373.

When more than 2 Channel Adapters are installed in a 3725 mdl 2, the reinstallation of the third and fourth Channel Adapters is subject to RPQ.

For purchased machines, when the second CLAB (#4773) is installed in a 3725 mdl 2, order the RPQ 8J5103 to convert a 3725 mdl 2 to a mdl 1. Conversion time is 12 hours.

#### ACCESSORIES (NONE)

#### SUPPLIES (NONE)

## 3726 COMMUNICATION CONTROLLER EXPANSION

### PURPOSE

Provides additional line and/or IBM Token-Ring network and/or channel attachment capability to the 3725 Communication Controller mdl 1.

### MODELS

#### Model 1 001

**Prerequisites:** If channel-attached, the 3726 requires a control unit position on a system channel. See processor pages.

### HIGHLIGHTS

One 3726 Communication Controller Expansion only attaches to a 3725 Communication Controller mdl 1, which is required for its operation and maintenance. It expands the capability of the 3725 by providing physical attachment for up to four Channel Adapters without Two-Processor Switches or two Channel Adapters with Two-Processor Switches and up to five Line Attachment Bases supporting up to 160 lines or up to 128 lines and up to 8 IBM Token-Ring Networks.

The HONE Configurator CF3725 must be used to configure a 3726.

**Communications Facilities:** The 3726 operates over PTT-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see the M2700 pages.

**Data Communication Equipment:** The 3726 attaches the same DCEs as the 3725.

**Ordering Procedures:** See the M3725 pages.

**Transmission Subsystem (TSS):** The Transmission Subsystem consists of Line Attachment Bases (LABs), Line Interface Couplers and Internal Clock Controls. Three types of LABs are available: LABs Type A, LABs Type B and LABs Type C. LABs Type A provide one communication scanner and LABs Type B provide two communication scanners. LABs Type C provide one communication scanner and internal clock control, and one Token-Ring Multiplexer.

The microprocessor based communication scanner serializes and de-serializes the data, supports various line protocols and provides character buffering and cycle steal transfer into the 3725 main storage. The scanner supports BSC (EBCDIC, ASCII) and SDLC in normal mode or block mode, i.e., in a mode of operation similar to the one of Scanner Type 3 of the 3705. Asynchronous protocols with 5 to 8 data bits and 1 to 2 stop bits are supported in "character mode" with EP/3725 R1 and ACF/NPC V2, in a mode of operation similar to the one of Scanner Type 2 of the 3705. They are also supported in "enhanced mode" with EP/3725 R2 and ACF/NCP V3 or V4. BSC tributary operation (EP or PEP) is supported in "character mode" at speeds up to 1200 bps with EP/3725 R1. It is also supported in normal mode at speeds up to 64K bps with EP/3725 R2. In addition, the scanner supports procedures for automatic calling units and X.21 native, X.21bis and X.20bis. It handles a variable number of lines depending on the protocol and the transmission speed.

Line Interface Couplers (LIC) provide the functions necessary to attach the external communications facilities and Data Terminal Equipment (DTEs). DTEs are attached to the 3726 either directly or via DCEs. The type of LIC to use depends on the physical interface presented by the DCE, not on the protocol transmitted through the port. For example, provided that the corresponding software is available in the 3725, X.25 packet switching may be supported through LIC Type 1, LIC Type 3, LIC Type 4A or LIC Type 4B, whichever is matching the physical interface presented by the X.25 network. According to its type a LIC attaches one or up to four duplex or half-duplex lines. Up to 8 LICs can be installed on a Line Attachment

Base (LAB), for a maximum of 32 lines per LAB. Up to 4 LICs can be installed on a Line and Token-Ring Attachment Base Type C for a maximum of 16 lines per LAB Type C.

Each LIC is assigned a scanner "weight", which is the percentage of scanner capacity consumed by the lines attached to that LIC. This weight depends upon the speeds and protocols of the lines. The specific values for each case are given in Tables 1 through 4B. The total load put on a scanner must not exceed 100 percent. To build the machine correctly, the plant must know the weights of the ordered LICs. These weights are conveyed to the plant by including the corresponding specify codes in the order.

Refer to the "Configuration Guide", SA33-0012, available to IBM representatives, for detailed explanations of the configuration rules used for the TSS.

Internal Clock Control features are required to attach devices which are not clocked by a DCE, such as asynchronous terminals and directly-attached synchronous terminals.

**Direct Attachment:** The 3726 allows direct (i.e., modemless) attachment of Data Terminal Equipment (DTE) using LIC-1, LIC-3, LIC-4A or LIC-4B and the corresponding direct attachment cable. LIC-1 attaches devices using asynchronous (start/stop) protocols at speeds up to 19.2K bps or devices using synchronous protocols (BSC or SDLC) at speeds up to 19.2K bps. LIC-3 attaches devices using BSC and SDLC protocols at speeds up to 245K bps. LIC-4A attaches devices using SDLC protocols at speeds up to 9600 bps. LIC-4B attaches devices using SDLC protocols at speeds up to 245K bps.

See ICC-2 (#4667) for details. For information on the available direct attachment cable types and lengths, refer to the "Installation Manual-Physical Planning", GC22-7064.

**Token-Ring Subsystem (TRSS):** It allows 3725 to attach to IBM Token-Ring Networks. It consists of Line and Token-Ring Attachment Bases (LABs) and Token-Ring Interface Couplers (TICs). One type of LAB is available: Lab Type C provides one Token-Ring Multiplexer (TRM) and up to four Token-Ring Interface Couplers. In addition LAB Type C provides one communication scanner, an internal clock control and up to four LICs (refer to "TSS" section). The TRM provides adaptation between the 3726 and the TICs. The Token-Ring Interface Coupler (TIC) is a set of components and a micro-processor running under control of a resident microcode which controls the Token-Ring Network using standard protocols. The TIC operates under control of the Network Control Program (NCP) only.

**Performance:** The maximum number of LICs or TICs capable of concurrent operation is a function of line speed, line protocols, the 3725 control program, traffic, and application work load. The number of LICs and TICs which can be physically installed may exceed the operational capability. Analysis should be performed to determine the operational limits in customer's situation. The HONE Configurator CF3725 should be used to perform such an analysis.

### SPECIFY

The voltage, nomenclature and color specify codes are not recommended for field installation. Specify codes may not be necessary to order a 3726, if the default options specified below are satisfactory.

- Power (AC, 1-phase, 3-wire):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Color: The standard color is pearl white (Except Canada > where it is blue <). For other colors, specify #9060

## MACHINES

for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray(Canada only), #9066 for pearl white <).

- Machine Nomenclature: Default is English US.

Canadian French	#2935	Portuguese	#2933
English US	#2924	Spanish	#2931
Japanese	#2930		

National Safety regulations require maintenance labels in local language. The language is determined by default from the 3-digit country code in the machine order. If the installation country is different from the order country specify #2900 which provides sets of labels in other languages. The CE selects and installs the appropriate one.

## SPECIAL FEATURES

### Non-Communications Features

**Line Increase Feature (#3602):** Allows the installation of more than three LABs Type A (#4771) or Type B (#4772) in the 3726. It is required for LABs in positions 7 and 8 of the 3726. Maximum: One per 3726. Field Installation: Yes.

**Two-Processor Switch (TPS) (#8320):** Provides a second channel interface to attach CA #1561 to a Multiprocessor System (MP) or to two channels of the same or different processors. One or both channel interfaces are enabled by a manual switch on the 3725 control panel. The enabled channel interface is operational when selected by the host channel. Data transfer cannot occur concurrently on both channel interfaces. Order channel cable groups #3920 and #1178 with this feature. Each #8320 installed in the 3726 reduces the number of installable Channel Adapters in the 3726 by one. Maximum: Two per 3726. Prerequisites: #1561 in the corresponding position. Two TPSs must be installed in the attached 3725 before any TPS can be installed in the 3726. Field Installation: Yes.

### Communications Features

**Channel Adapter (CA) (#1561):** Provides the logical and physical interface between a 3726 and a S/370 (except mdl 115 and 125), 303X, 308X, 43XX processor. It attaches to a byte multiplexer, block multiplexer or selector channel. Order channel cable groups #3920 and #1178 with this feature. Limitations: Each TPS installed in the 3726 reduces the number of installable CAs by one. Maximum: Four per 3726. The possible combinations of CAs and TPSs Switches are:

Number of CAs	CA Position	TPS Position
0	-	-
1	3	3
2	3, 4	3, 4
3	3, 4, 5	3
4	3, 4, 5, 6	-

**Prerequisites:** Two #1561s must be installed in the attached 3725 before any #1561 can be installed in the 3726. Field Installation: Yes.

**Internal Clock Control (#4667):** (Not available after July 1, 1985. Replace by ICC-2, feature code #4667.) Provides bit clocking when the attached external DCE does not provide this clocking, or when direct attachment of the DTE is required. It provides clocking for eight LICs (up to 32 lines) at 50, 110, 134.5, 200, 300, 600 and 1200 bps for operation with or without a DCE and at speeds of 2400, 4800, 9600, 19,200 and 56,000 bps for operation without a DCE (direct attachment). At speeds up to 1200 bps the speed is set at the time of control program generation and must match that of the internal clock of the attached DTE. At speeds above 1200 bps, the DTE must use external clocking (provided by the 3726) and the speed is set by hardware in the 3726. At the plant the speed will be set to 9600 bps. At installation time it may be changed by the CE on a per LIC basis

to 2400, 4800, 19,200 or 56,000 bps. Maximum: One per LAB Type A or Type B. Field Installation: Yes.

**Internal Clock Control Type 2 (#4667):** For internally clocked DTEs, the ICC-2 provides business machine clocking to the 3725, at data rates of 50, 110, 134.5, 200, 300, 600, 1200, bps for asynchronous (S/S) or synchronous (BSC) operation with or without a DCE (direct attachment). It also provides business machine clocking to the 3725, at data rates of 75, 100, 2400, 4800, 9600, and 19.2K bps for asynchronous (S/S) operation with or without a DCE (direct attachment). The speed of the ICC-2 is set, for each DTE, at generation time of the control program and must match that of the internal clock of the attached DTE.

For externally clocked DTEs, it provides bit clocking to a directly attached DTE at data rates of 2400, 4800, 9600, 19.2K, 56K, and 245K bps for synchronous (BSC or SDLC) operation without a DCE and at a data rate of 2400, 4800, 9600, and 19.2K bps for start/stop operation without a DCE. The selected speed is set by hardware in the 3725. At the plant the speed is set to 9600 bps and at installation time, it may be changed by the CE on a per LIC basis. Maximum: One in second CLAB (#4773) and one in the LAB Type A (#4771) or Type B (#4772). Field Installation: Yes.

**Line Attachment Base Type A (#4771):** Provides a communication scanner and a physical base for up to eight LICs Type 1 (#4911) or Type 4A (#4941). Limitations: The sum of LIC weights must not exceed 100. Except by MES, only LICs with weight 12 or 18 may be installed on the LAB Type A. Maximum: Five per 3726, including LABs Type B (#4772) and LABs Type C (#4774). Prerequisites: #3602 for #4771 in position 7 of the 3726. A LAB Type A or B or C must be installed in position 3 of the attached 3725 before any LAB can be installed in the 3726. Specify #9671 only to order a Line Attachment Base Type A without any associated LIC. Field Installation: Yes. To order a LAB Type A in a 3726, select the appropriate Specify Codes as per the occupied position of the LAB Type A in the 3726. LABs are installed in the 3725 mdl 1 and in the 3726 according to the following placing sequence: first, all LAB Cs with LICs or TICs; second, empty LAB Cs; third, all LAB Bs with LICs; fourth, all empty LAB Bs; fifth, all LAB As with LICs; and last, all empty LAB As.

LAB Position	Specify Code
4	#8941
5	#8951
6	#8961
7	#8971
8	#8981

**Line Attachment Base Type B (#4772):** Provides two communication scanners and a physical base for up to eight LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942). Each scanner controls up to four LICs. Limitations: The sum of the four LIC weights attached to one communication scanner must not exceed 100. Exclusive with LAB Type A (#4771). Maximum: Five per 3726, including LAB Type A (#4771) and LAB Type C (#4774). Prerequisites: #3602 for #4772 in position 7 of the 3726. A LAB Type A or B or C must be installed in position 3 of the attached 3725 before any LAB can be installed in the 3726. Specify #9672 only to order a Line Attachment Base Type B without any associated LIC. Field Installation: Yes.

To order a LAB Type B in a 3726, select the appropriate Specify Codes as per the occupied position of the LAB Type B in the 3726. LABs are installed in the 3725 mdl 1 and in the 3726 according to the following placing sequence: first, all LAB Cs with LICs or TICs; second, empty LAB Cs; third, all LAB Bs with LICs; fourth, all empty LAB Bs; fifth, all LAB As with LICs; and last, all empty LAB As.

LAB Position	Specify Code
4	#8942
5	#8952
6	#8962
7	#8972
8	#8982

**Line and Token-Ring Attachment Base Type C (#4774):** LAB Type C provides a communication scanner, a Token-Ring Multiplexer, an



internal clock control, a physical base for up to four LICs Type 1 (#4911), Type 2 (#4921), Type 3 (#4931), Type 4A (#4941) or Type 4B (#4942) and for up to four Token-Ring Interface Couplers (#4991). Limitations: The sum of the four LIC weights attached to the scanner must not exceed 100. Maximum: One per 3726 if one already installed in 3725 mdl 1. Two per 3726 if none installed in 3725 mdl 1. Prerequisites: Use ordering procedures of specified configurations Specify Code #6000. #3602 for #4774 in position 7 of the 3726. A LAB Type A or B or C must be installed in position 3 of the attached 3725 before any LAB can be installed in the 3726. Specify #9674 only to order a LAB Type C without any associated LIC and TIC. For each LAB Type C in a 3726, order the specify code corresponding to its position in the 3726 (position 4 to 8) according to the following rule: LABs are installed in the 3725 mdl 1 and in the 3726 according to the following placing sequence: first, all LAB C with LICs or TICs; second, all empty LAB Cs; third, all LAB Bs with LICs; fourth, all empty LAB Bs; fifth, all LAB As with LICs; last, all empty LAB As. A different LAB placing sequence is allowed. For MES, use Specify code #6000 if it is not already in the machine history. No discontinuity in LAB placing sequence is allowed.

LAB Type C Positions	Specify Code
4	#8944
5	#8954
6	#8964
7	#8974
8	#8984

3726 order with a LAB Type C (#4774) or LAB Type C MES order to be installed on a 3726, will require a prerequisite MES order to add EC 342076 on the associated 3725. Use Specify Code #9710 to order EC 342076 on a 3725.

**Line Interface Coupler Type 1 (#4911):** Provides four EIA RS-232-C/CCITT V.24 interfaces for communication lines operating at transmission speeds up to 19.2K bps. The lines may be used either for duplex or half-duplex data transmission. LIC Type 1 provides direct (modemless) attachment of synchronous DTEs at 2400, 4800, 9600 or 19.2K bps, if it is associated with an ICC. The synchronous DTEs attached directly to a given LIC must operate at the same speed. Lines connected via DCEs to this LIC may operate at a different speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400, 4800 or 19.2K bps in the field. Direct attachment of asynchronous devices is provided at speeds up to 19.2K bps. Depending on the options chosen at the generation of the control program, each port of LIC Type 1 can support one of the following interfaces:

Duplex or half-duplex EIA RS-232/CCITT V.24 at speeds up to 19.2K bps  
EIA RS-366/CCITT V.25 Autocall Equipment  
X.21bis  
X.20bis

**Cables:** For each LIC type 1, four cables for DCE, autocall equipment and/or direct attachment must be ordered. Order cable group #1404 for DCE attachment, or cable group #0081 for attachment to NTT DCEs, cable group #0082 for attachment to automatic calling units or cable group #0093 for attachment to NTT automatic calling units, cable group #0085 for V.24/RS-232-C direct attachment asynchronous, or cable group #1400 for V.24/RS-232-C direct attachment synchronous.

**EIA RS-232-C/CCITT V.24 Interface Modem Attachment:** The LIC Type 1 (#4911) can support a cable length of up to 100m when connecting to a 3863, 3864 or 3865 modem or equivalent. Cable lengths up to 35m (115 ft) are supported when connected to any modem that complies with the EIA/CCITT Interface Specifications. To connect a cable longer than 35m (115 ft) the following must be done:

- Determine the suffix level (the two alpha characters on the date tag) of each 3863, 3864 or 3865 modem to be interconnected. If the suffix is "FG" or later, no further action is required.
- If the suffix is "DG" or earlier: A 3863 or 3864 or 3865 modem which does not have Data Multiplexer #3260 installed must

have EC 344120 installed -- a 3865 modem with Data Multiplexer #3260 installed must have EC 323406 installed.

- Order the cable: See "Ordering Procedure".

Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: If the transmission speed of any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is five at up to 14,400 bps and four at up to 19,200 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per LAB Type A (#4771) or Type B (#4772). Prerequisites: LAB Type A (#4771) or Type B (#4772). An ICC on the same LAB, if direct attachment is required or if DCE does not provide clocking. Specify: LIC weights in accordance with Table 1. Field Installation: Yes.

Table 1: LIC Type 1 Weight Specify Codes

Line Control	Trans- mission Speed (bps) LT/EQ	LIC Wt.	-Specify no ICC req'd	Code- ICC req'd
-ACF/NCP 3725 or EP/3725, except EP/3725 R1 for BSC tributary operation				
AUTOCALL	N/A	12	#9101	N/A
BSC EBCDIC	9600	12	#9101	#9121
ASCII	4800			
EBCDIC	14400	25***	#9105	N/A
EBCDIC	14400	20****	#9108	N/A
EBCDIC	19200	25	#9105	#9125
ASCII	9600	25	#9102	#9122
ASCII	14400	37	#9106	N/A
ASCII	19200	50	#9103	#9123
SDLC HDX	9600	12	#9101	#9121
DX	4800			
HDX	14400	25***	#9105	N/A
HDX	14400	20****	#9108	N/A
HDX	19200	25	#9105	#9125
DX	9600	25	#9102	#9122
DX	14400	42	#9107	N/A
DX	19200	50	#9103	#9123
-EP/3725 R1, for BSC tributary operation				
Ch Mode	1200	42	N/A	#9113
-ACF/NCP 3725 and EP/3725, except ACF/NCP V2 and EP/3725 R1. (Speeds above 1200 bps are supported only for externally clocked DTEs.)				
S/S (*)	1200(1)	12	#9101	#9121
	2400(1)	25	#9102	#9122
	4800(1)	50	#9103	#9123
	9600(1)	100	#9104	#9124
	14400**	100	#9104	N/A
	19200**	100	#9104	#9124

\* Weights and specify codes apply to most commonly used DTEs, i.e. those DTEs using transmission codes with at least 10 bits per character (start, data/parity, stop(s)) like ASCII. DTEs using transmission codes with less than 10 bits per character (start, data/parity, stop(s)), are also supported at speeds up to 600 bps.

\*\* At 14400 and 19200 bps only two ports of the LIC 1 may be used.

\*\*\* Former weight 25 and specify code #9105 remain available upon request.

\*\*\*\* Prerequisite specify code #6000.

-ACF/NCP V2 and EP/3725 R1

S/S	300	12	N/A	#9121
Ch Mode	600	18	N/A	#9111
	1200	37	N/A	#9112

**Line Interface Coupler Type 2 (#4921):** Provides attachment for one communication line at speeds up to 230.4K bps. LIC Type 2 supports either duplex or half-duplex data transmission. It has a digital interface for attachment to a nonswitched "wideband" Type 8751, 8801 or 8803 Service. Cables: For each LIC type 2 order one cable group #0086. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths. Limitations: When an LIC Type 2 is installed on a communication scanner, the maximum number of LICs for that scanner is four at up to 72,000 bps and two at up to 128,000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per LAB Type B (#4772) or four per LAB Type C (#4774). Prerequisites: #4772 or #4774. Specify: LIC weights in accordance with Table 2. Field Installation: Yes.

Table 2: LIC Type 2 Weight Specify Codes

Line Control	Trans-mission Speed (bps) LT/EQ	LIC Wt.	Specify Code
BSC (See Note)	EBCDIC 64000	25	#9201
	ASCII 64000		
	ASCII 6400	42*	#9202
SDLC	HDX 72000	25	#9201
	DX 64000	42*	#9202
	HDX 128000	50**	#9204
	DX 128000		
	HDX 230400	100	#9203
	DX 230400		

**Note:** Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, "BSC Char. Mode").

\* Former weight 42 and specify code #9202 remain available upon request.

\*\* Prerequisite specify code #6000.

**Line Interface Coupler Type 3 (#4931):** Provides attachment for one nonswitched high-speed communication line via the CCITT V.35 interface at speeds up to 256K bps. The line may be used for duplex or half-duplex data transmission. LIC Type 3 provides direct (modemless) attachment at up to 245K bps, if it is associated with an ICC. Cables: For each LIC Type 3, order one cable group #0087 for DCE attachment or cable group #0088 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: When an LIC Type 3 is installed on a communication scanner, the maximum number of LICs for that scanner is four at up to 72,000 bps and two at up to 128,000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per LAB Type B (#4772) or four per LAB Type C (#4774). Prerequisites: #4772 or #4774. An ICC on the same LAB, if direct attachment

is required. Specify: LIC weights in accordance with Table 3. Field Installation: Yes.

Table 3: LIC Type 3 Weight Specify Codes

Line Control	Trans-mission Speed (bps) LT/EQ	LIC Wt.	-Specify no ICC req'd	Code-ICC req'd
BSC (See Note)	EBCDIC 64000	25	#9301	#9321
	ASCII 64000			
	ASCII 64000	42*	#9302	#9322
SDLC	HDX 72000	25	#9301	#9321
	DX 64000			
	DX 64000	42*	#9302	#9322
	HDX 128000	50**	#9305	N/A
	DX 128000			
	HDX 256000	100	#9303	#9323
	DX 256000			

**Note:** Speed/LIC weight not supported with EP/3725 R1 for tributary operation (see LIC 1, BSC "Char. Mode").

\* Former weight 42 and specify codes #9302 and #9322 remain available upon request.

\*\* Prerequisite specify code #6000.

**Line Interface Coupler Type 4A (#4941):** Provides four CCITT X.21 interfaces as defined in GA27-3287 for communication lines operating at speeds up to 9600 bps. Both switched and nonswitched operation are supported. The physical interface follows the CCITT V.11 Recommendation. LIC Type 4A provides direct (modemless) attachment at 2400, 4800 or 9600 bps, if it is associated with an ICC. The DTEs directly attached to the same LIC must operate at the same speed. Clock speed is set to 9600 bps at the plant and may be changed to 2400 or 4800 bps in the field. Cables: For each LIC Type 4A, four cables for DCE and/or direct attachment must be ordered. Order cable group #0089 for DCE attachment or cable group #0091 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. If any of the lines connected to a communication scanner exceeds 9600 bps, the maximum number of LICs for that scanner is four. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per LAB Type A (#4771) or Type B (#4772). An ICC on the same LAB, if direct attachment is required. Specify: LIC weights in accordance with Table 4A. Field Installation: Yes.

Table 4A: LIC Type 4A Weight Specify Codes

Line Control	Trans-mission Speed (bps) LT/EQ	LIC Wt.	-Specify no ICC req'd	Code-ICC req'd
SDLC	HDX 9600	12	#9401	#9421
	DX 4800			
	DX 9600	25	#9402	#9422

**Line Interface Coupler Type 4B (#4942):** Provides one CCITT X.21 interface as defined in GA27-3287 for a communication line operating at speeds up to 256K bps. Switched operation is supported up to 48K bps. Nonswitched operation is supported at up to 256K bps.

The physical interface follows the CCITT V.11 Recommendation. LIC Type 4B provides direct (modemless) attachment at up to 245K bps, if it is associated with an ICC. Cables: For each LIC Type 4B, order one cable group #0089 for DCE attachment or one cable group #0091 for direct attachment. Refer to the "Installation Manual-Physical Planning", GC22-7064, for information on available cable lengths and types. Limitations: Supports only the SDLC line protocol. When an LIC Type 4B is installed on a communication scanner, the maximum number of LICs for that scanner is four at up to 72,000 bps and two at up to 128,000 bps. Due to the sum of LIC weights, the number of LICs may have to be further reduced. Maximum: Eight per LAB Type B (#4772) or four per LAB Type C (#4774). Prerequisites: #4772 or #4774. An ICC on the same LAB, if direct attachment is required. Specify: LIC weights in accordance with Table 4B. Field Installation: Yes.

Table 4B: LIC Type 4B Weight Specify Codes

Line Control		Trans- mission Speed (bps) LT/EQ	LIC Wt.	-Specify Code- no ICC ICC req'd req'd	
SDLC	HDX	72000	25	#9403	#9423
	DX	64000			
	DX	64000	42*	#9404	#9424
	HDX	128000	50**	#9406	N/A
	DX	128000			

\* Former weight 42 and specify codes #9404 and #9424 remain available upon request.

\*\* Prerequisite specify code #6000.

**Token-Ring Interface Coupler Type 1 (TIC) (#4991):** Provides one attachment to IBM Token-Ring Network. Cables: For each TIC, order one cable group #1666. When 3725 is to be installed in an IBM Token-Ring Network where IBM Cabling System 3 Specified Media (Telephone twisted pair) is used, a Data Grade Media to Type 3 Filter is required between the 3726 TIC cable and the telephone twisted pair wiring. Refer to "IBM Token-Ring Network Twisted Pair Media Guide" (GA27-3714).

Refer to the "Installation Manual-Physical Planning", GC22-7064 for information on available cable lengths. Maximum: Four. Prerequisites: LAB Type C (#4774). Field Installation: Yes.

Configuring and Ordering Procedures of Specified Configurations:

## General:

It is possible to configure a 3725 without following all the rules described in the IBM 3725 Communication Controller Configuration Guide, (Chapter "Graphic Configuration Procedure").

This configuring procedure allows flexibility in placing Line Attachment Base (LAB) Type A or B Line Interface Couplers (LICs) and Internal Clock Control (ICCs) in the 3725 and should only apply to match very specific configuration requirements.

Such configurations are called: "Specified Configurations" and should be ordered with Specify Code #6000.

Use of Specified Configurations results in bypassing some of the standard configuring rules. Therefore, use of the CF3725 HONE Configurator is required at order entry, order alteration or MES entry time to validate all specified configurations and any subsequent modifications to ensure they meet the mandatory configuring rules.

For configuring information, refer to the IBM 3725 Communication Controller Configuration Guide, appendix "Configuring and Ordering Specified Configurations", and to the HONE Configurator CF3725.

## Ordering Procedure:

Use CF3725 to configure the 3725 to the customer's requirement.

Specify Code #6000 is required.

Rerun CF3725 to validate the actual configuration 12 weeks before the scheduled ship date.

Make a copy of the configuration section of CF3725 output showing LAB diagrams. On each page, print or type: date, machine type, Plant Order number, scheduled shipment date, customer name, and customer number. Mail to manufacturing plant, "Order Department".

Rerun CF3725 each time an order alteration is made and mail the configuration section of the CF3725 output to the manufacturing plant as described above.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3727 OPERATOR CONSOLE

### PURPOSE

An 3727 operator console when attached to the 3725 Communication Controller provides an operator interface to the Maintenance and Operator Subsystem (MOSS) of the 3725. One primary operator console is required for installation, operation and maintenance of the 3725. An optional alternate operator console may be located at up to 150 meters (492 feet) from the 3725.

### MODELS

- | **Model 70 70H:** Operator Console 3727 for 200-240V
- | **Model 70 70L:** Operator Console 3727 for 100-120V

**Note:** One order of a 3727 mdl 700 Operator Console automatically provides one logic unit, one keyboard feature, and one display feature, unless otherwise requested.

**Note:** Language - English US only, Keyboard - English US only.

**Prerequisites:** One 3725 Communications Controller.

### HIGHLIGHTS

- Operator console consisting of three elements: The logic unit, the display feature and the keyboard feature.
- Display of 1,920 characters in 24 rows of 80 characters with operator status on a 25th line.
- Buffered transmission of data as well as field manipulation of data by use of attribute characters.
- English US Keyboard: 59 keys for alphameric and special characters, 12 keys for numeric keypad, 8 keys for cursor control, editing and MOSS interrupt, 5 keys for program functions, and 3 dedicated keys for direct display of MOSS messages, Central Control Unit (CCU) functions and cursor positioning for function selection.

**Operator Factors:** The operator console has a contrast enhancement filter. The screen is organized by functional areas: 3725 current machine status on the first three lines, pre-prepared menus and operation options in the central part, alarms, messages, and operator information on the last two lines. An audible alarm is provided to alert the operator who may adjust its volume. The display element can be tilted and swivelled to change the screen angle for the operator. The cable-connected keyboard can be moved and has separators to help prevent accidental striking of control keys.

**Input Editing Capability:** Eight keys control the cursor without affecting any information on the screen: New line, tab, back tab, move-cursor, and backspace keys. In addition three editing keys are provided: Insert character, delete character, and erase keys. All alphameric special characters, and move-cursor keys have typamatic capability.

**Maintenance:** On-site maintenance will be provided for the 3727.

**Cables:** The 3727 Operator Console requires an attachment cable to communicate with the 3725 Communication Controller. The primary 3727 operator console is installed with a cable of 7.5 meters (25 feet), which is included in the shipping group of the 3725 Communication Controller.

The alternate operator console is supplied with a cable of 13.5 meters (45 feet). This cable is obtained by ordering cable group #0099 of the 3725. Shorter or longer cable up to 150 meters (490 feet) may be ordered. For details, see "Configuring and Ordering Procedures of Specified Configurations" in the M3725 pages.

### SPECIFY

#### Power and Power Cable

- **Power (100-120/200-240V, AC 1 phase, 3-wire, 50/60 Hz):**

The third of the 3-character mdl number is used to select the voltage:

3727 mdl 70H for 200-240V  
 3727 mdl 70L for 100-120V

- **Power cable: 3.0 meters (10 feet)**

The 3-digit Country Code entered on the DPMO will be used to select a power cable plug based on the specification most commonly used in that country.

### SPECIAL FEATURES

**Display (#3255):** Provides display screen for the 3727. Displays up to 1,920 characters in 24 rows of 80 characters each. Each character is represented in a maximum 7x14 dot matrix in the 9x16 contiguous box matrix. Displays 70 graphic characters: 26 upper case alphabetic, 10 numerics and 33 special characters plus a space.

**Keyboard (#4655):** Provides movable keyboard for the 3727. All alphameric, special characters, and move cursor keys have typamatic capability. A 12 key numeric keypad, five program function keys and three special keys are also provided.

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**4300 Processors Console Table (#1550).**

**3081 Processors Console Table (#1560).**

### SUPPLIES (NONE)

## 3728 COMMUNICATION CONTROL MATRIX SWITCH

### PURPOSE

The IBM 3728 Communication Control Matrix Switch with its associated control terminal is a data communications switching system that is connected between the Communications Controllers and the modems, and between the modems and the telecommunications lines, that provides the capability of configuring, re-configuring and monitoring the data network from a central location via an operator control terminal.

### MODELS

**Model 1 001:** The 3728 is the basic machine in the system. Port interface options and control options are added to the base 3728 as required by the specific customer configuration. The minimum system uses a single base unit. Larger systems use one base unit and up to 15 extension units. The system size is determined by the number of feature options ordered.

**Maximum Configuration:** The maximum configurations are as follows:

- Single Unit System
  - 120 interfaces of CCITT V.24/EIA RS-232-C at speeds up to 19.2K bps
  - or 60 interfaces of CCITT V.35 at speeds up to 76.8K bps
  - or 64 interfaces of CCITT X.21 at speeds up to 16K bps
  - or 240 4-wire analog interfaces
  - or a combination of interfaces depending upon card positions utilized.
- Multiple Unit System (Single Location)
  - One base unit (Single Unit System)
  - 15 extension units
  - System capacity up to
    - ▲ 1920 CCITT V.24/EIA RS-232-C at 19.2K bps
    - ▲ or 960 CCITT V.35 at speeds up to 76.8K bps
    - ▲ or 1024 CCITT X.21 at speeds up to 16K bps
    - ▲ or 3840 4-wire analog
    - ▲ or a combination of the above interfaces depending upon port card types and the number of card positions utilized.
- Multiple Location System (NETWORK)
  - Up to 61 nodes. A node is defined as a 3728 System or the Support Processor - IBM PC/XT control terminal. The 3161 Display Station is not classified as a node.
  - Each 3728 System must have at least one control terminal.
- Signals Switched:
  - CCITT V.24/EIA RS-232-C

PIN NO.	NAME
2	TX Data (TD)
3	RX Data (RD)
4	Request to Send (RTS)
5	Ready for sending (RFS)
6	Data Set Ready (DSR)
8	Carrier Detect (CD)
-	Request to Send Return (RTSR)
15	Transmit Clock (TC)
18	Local Loopback (Test Control) (LLB)
25	Test Indicate (TI)
17	Receive Clock (RC)

- Transmit Clock Return (TCR)
- 20 Data Terminal Ready (DTR)
- 22 Ring Indicator (RI)
- 23 Data Rate Select (DRS)
- 14 New Sync (NS)

### CCITT V.35

- | PIN NO. | NAME                            |
|---------|---------------------------------|
| Y,a     | Transmit Clock True (TCT)       |
| V,x     | Receive Clock True (RCT)        |
| u,W     | Transmit Clock Complement (TCC) |
| Z,b     | Receive Clock Complement (RCC)  |
| P,S     | Transmit Data (TD)              |
| R,T     | Receive Data (RD)               |
| C       | Request to Send (RTS)           |
| D       | Ready For Sending (RFS)         |
| F       | Carrier Detect (CD)             |
| n       | In Service (IS)                 |
| either  |                                 |
| E       | Data Set Ready (DSR)            |
| H       | Data Terminal Ready (DTR)       |
| or      |                                 |
| J       | Ring Indicator (RI)             |
| K       | Local Loopback (LLB)            |

### CCITT X.21

- |      |                                  |
|------|----------------------------------|
| T(A) | Transmit True                    |
| C(A) | Control True                     |
| R(A) | Receive True                     |
| I(A) | Indication True                  |
| S(A) | Signal Element Timing True       |
| T(B) | Transmit Complement              |
| C(B) | Control Complement               |
| R(B) | Receive Complement               |
| I(B) | Indication Complement            |
| S(B) | Signal Element Timing Complement |

**Ordering Information:** The base unit is ordered as the 3728. Each extension unit, up to 15 allowed at each location, is also ordered as the 3728. Each unit, base and extension, will have unique serial numbers applied. Each extension unit ordered (at each location) must have a corresponding specify code assigned to identify the location address of the extension unit within the system configuration.

**Note:** The control terminals/printers are not provided as a part of the 3728, but must be ordered separately.

**Limitations:** The signal distortion of the 3728 may result in specific configuration rules for some modem and communication controller environments that could reduce the number of port interfaces allowed in a system configuration. When configuring/ordering the system, refer to the "IBM 3728 Installation Planning and Configuration Guide", GA27-3641 and the Hone Configurator CF3728 for technical details and ordering information.

### HIGHLIGHTS

- Characteristics:
  - Rack mount cabinet
  - Card cage assembly
  - ▲ 4 card positions for optional control features

- ▲ 15 card positions for optional port interface features
  - Redundant microprocessors, control logic and power supply modules
  - Interface Switched:
    - ▲ CCITT V.24/EIA RS-232-C up to 19.2K bps
    - ▲ CCITT V.35 up to 153K bps
    - ▲ CCITT X.21 up to 128K bps
    - ▲ 4-wire analog
  - Modular construction accommodates customer's network growth requirements
  - Facilities available for connecting external monitor and test equipment on the modem and line interfaces.
  - Realtime monitoring of the status of EIA and V.35 signals.
- Control Terminal: The control terminal provides the following capabilities:
  - Unattended operation, i.e., control of any 3728 on the network from a central control terminal. The control link between the 3728's may be a leased or switched line or direct-attach cable.
  - Menu driven system for reconfiguring network.
  - Stored network configurations that can be executed as required.
  - Establishing alarm conditions for any line interface.
  - Controlling diagnostics and line testing.

The options of the control terminal available are:
- A TTY compatible terminal with the following characteristics:
  - Character mode
  - Half- or Full-Duplex
  - Eight Data Bits
  - Two Stop Bits
  - Display (24 lines x 80 characters)
  - Alphanumeric keyboard

4201 Proprinter and Asynchronous Serial Interface Module.
- (Except Japan > Support Processor - IBM Personal Computer XT
 

The PC/XT represents one of the 61 available network addresses and is dedicated to 3728 operation. <)
- (Japan only > Support Processor - IBM Personal Computer XT or equivalent. The Support Processor represents one of the 61 available network addresses and is dedicated to 3728 operations. <) This option is not provided as a part of the 3728. The PC/XT can be ordered by the customer from IBM, or from an authorized dealer. The minimum configuration is as follows:
  - 10 MB Fixed Disk Drive (standard)
  - 320 KB Fixed Diskette Drive (standard)
  - 640 K RAM (order increments of #1003 as required)
  - Standard Keyboard
  - Color/Graphics Adapter (#4910 or 1504910)
  - RGB Color Monitor (5153 model 001)
  - Math Coprocessor Module (#1002 or 1501002)
  - (2) Asynchronous Communications Adapter (#2074 or 1502074)

Although not required for system operation, the following is recommended:

  - Printer adapter (#5200 or 15055200)
  - 5182 Color Printer model 001 (with 4-color ribbon P/N 1501573)

The PC/XT, when selected as the control terminal, can be used to control the Maintenance and Operating Subsystem (MOSS) of any 3725/26 in the network where a 3728 is installed.

PC/XTs, when used at the central and remote sites, may replace both the 7427 Console Switching Unit and the associated

3727 primary or alternate console. The characteristics of this application are:

- The operator, at the central location, can control the remote 3725 MOSS attached to the remote 3728.
- With the PC/XT in MOSS mode, notification of 3728 and 3727 messages will be presented to the PC/XT operator.

When the PC/XT is used as the control terminal, IBM 3728 Support Processor licensed program (5668-787) is a pre-requisite and must be ordered separately. For remote MOSS control, a PC/XT is required as the control terminal at the central and remote sites.

When multiple control terminals are attached to the same 3728, the primary control terminal must be located (cable attached) within 6m of the 3728. The alternate terminals can be located (cable attached) up to 35m from the 3728.

● Data Communication Equipment:

- Modems: The following modems or units may be used with the 3728:

Modem (models)	Speed (bps)	Lines
3833-1	2400	Nonswitched voice grade
3834-1	4800	Nonswitched voice grade
3863-1	2400/1200	Nonswitched or switched voice grade
3864-1	4800/2400	Nonswitched or switched voice grade
3865-1/2	9600/4800	Nonswitched voice grade
3868-1	2400/1200	Nonswitched voice grade
3868-2	4800/2400	Nonswitched voice grade
3868-3/4	9600/4800	Nonswitched voice grade
3872-1	2400/1200	Nonswitched or switched voice grade
3976-3	1200/600	Nonswitched or switched voice grade
5811-10	2400 to 19200	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400 to 19200	Nonswitched baseband
5811-28		Rack mount version of 5811-20
5812-10	2400 to 19200	Nonswitched baseband
5812-18		Rack mount version of 5812-10
5865-2/3	9600/7200/4800	Nonswitched voice grade
5866-2/3	14400/9600	Nonswitched voice grade
5868-52		Rack mount version of 5865-2
5868-62		Rack mount version of 5866-1/2

**Note:** 4-wire SNBU is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire SNBU is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

- PTT Mandatory DCEs: The 3728 attaches the PTT mandatory DCEs meeting CCITT Recommendation V.24, V.28, ISO Standard 2110 and the relevant CCITT Recommendations for data transmission speed. The 3728 attaches the PTT mandatory DCEs meeting CCITT Recommendations V.35 and ISO Standard 2593. The 3728 attaches the PTT mandatory DCEs meeting CCITT recommendation X.21 and ISO Standard 4903.
- Public Data Networks: The 3728 supports the public data networks which provide interfaces complying with the EIA RS-232-C/CCITT Recommendation V.24/V.28 or with the CCITT V.35 Recommendation and are supported by the 3725/3726 Communication Controller. Refer to the 3725/3726 attachments listed in the charts of the M2700 pages. The 3728 supports the public data networks which provide interfaces complying with the EIA RS-232-C/CCITT recommendation V.24/V.28 or with the CCITT V.32/X.21 recommendation and are supported by the 3725/3726 Communication Controller. Refer to the 3725/3726 attachments listed in the charts of the M2700 pages.
- Non-IBM DCEs: Non-IBM DCEs complying with EIA RS-232-C/CCITT Recommendation V.24/V.28 and CCITT V.35 Recommendation may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin. Non-IBM DCEs complying with EIA RS-232-C/CCITT recommendation may be attached under the provisions of the IBM Multiple Supplier Systems Bulletin.
- Data Terminal Equipment: The following units may be used with the 3728:

3704 Communication Controller  
3705 mdl 2 Communication Controller  
3705 mdl 80 Communication Controller  
3725 mdls 1/2 Communication Controller  
3726 Communication Controller Expansion  
3710 Network Controller

The 3728 also supports attachment of the DTE equipment which provide the EIA RS-232-C CCITT Recommendation V.24/V.28 and V.35 Interfaces and are supported by the 3725/3726 Communication Controllers. Refer to the 3725/3726 attachments listed in the charts of the M2700 pages. The 3728 also supports attachment of the DTE equipment which provide the EIA RS-232-C CCITT recommendation V.24/V.28, V.35 and X.21 Interfaces and are supported by the 3725/3726.

- Communication Controllers: Refer to the 3725/3726 attachments listed in the charts of the M2700 pages.

### ● Applications

- Spare Communication Controller: To improve the reliability/availability of the network by having the lines connected to one communication controller switched to another communication controller when a failure occurs or when the controller is not available.
- Control of Network Load: Large networks that span several time zones can switch lines to the communication controller as required to achieve greater utilization of the network.
- Network Tests and Diagnostics: To maintain network availability, network managers have the capability of performing tests and diagnostics without data traffic interruption. These tests can be centrally controlled but implemented at any remote site in the network.
- Network Growth: For the user that is expanding the network by adding lines or communication controllers, the

3728 can be used to switch lines between controllers, for installation/test, without interrupting other lines on the system.

- Alter Configurations: Change the network configuration to recover from failures of Communication Controller ports, Communication Controllers, modems, or communication lines.

**Publications:** Following is a list of the publications available for the 3728:

IBM 3728 Introduction Manual, GA27-3640  
IBM 3728 Installation Planning and Configuration Guide, GA27-3641  
IBM 3728 Installation Instructions, SY27-0274  
IBM 3728 Operations Guide, GA27-3643  
IBM 3728 Support Processor Operations Guide, GA27-3644  
IBM 3728 Parts Catalog, S131-0094

**HONE Configurator (CF3728):** The 3728 may be configured using the CF3728 Aid, available on the HONE System. Using CF3728 will simplify the configuration, ordering, and cabling process for the 3728. The user will enter device attachment and interconnection data and CF3728 will provide a priced feature report for ordering and a graphical configuration report that will be helpful in the cabling process. A copy of this report must be given to the customer and to the CE, as it will be needed to install the DCE and other communication cables.

The HONE configurator will also be used to configure MESSs. This procedure provides a list of feature and specify codes which is used to order the MES, and an updated graphical configuration report of the cards in the 3728 units. A copy of the updated configuration on the graphical configuration printout, including the MES order number, must be sent by the marketing representative to the servicing branch office for installation planning purposes. This updated configuration is required by the CE as it provides the only source of internal machine feature location, plugging information for the cards, and connection information for the cables.

**Customer Responsibilities:** The customer is responsible for:

- Providing an adequate site preparation.
- Verifying that any OEM equipment meets the required criteria.
- Obtaining an adequate control terminal.
- Review the configuration data and verify proper cable lengths prior to order confirmation.
- Obtaining the PC/XT Hardware Maintenance and Service Manual, P/N 6322513, when the PC/XT is selected as the control terminal.
- For remote service capability, IBM maintenance contract customers must provide an external 300/1200 bps, asynchronous, full-duplex modem. When the modem is not being used for remote service the customer can use this modem in conjunction with the 3728 for any customer application.

### SPECIFY

Unless indicated otherwise, these specify codes are only available at time of manufacture.

- (Canada only) > Voltage: One of the following must be specified:

#2800 120V, 60 Hz  
#9914 240V, 60 Hz

- Power Cables: One power cable from the following table must be specified:

120V	Cable/Length Description	240V
#9016	- 4.3m (14 ft)	Above floor - #9019
#9017	- 4.3m (14 ft)	Below

- #9018 - 1.8m (6 ft) floor - #9019
- #9986 - 1.8m (6 ft) Below floor - #9020
- Above floor - #9020<)
- Power:
  - 50 Hz 60 Hz
  - 200V #2806 200V #2732
  - 220V #2813 220V #2803
  - 230V #2821 240V #9914
  - 240V #2801 120V #2800
- Machine Nomenclature: There is no external nomenclature.
- Position Code: Each extension unit must be assigned an appropriate specify number as follows:
  - #9001 - Extension Unit #1 (2nd unit)
  - #9002 - Extension Unit #2 (3rd unit) Continue in sequence thru
  - #9015 - Extension Unit #15 (16th unit in system configuration)

## SPECIAL FEATURES

## CONTROL FEATURES

**Base Unit Feature (#4001):** Provides one mini cassette drive and a cassette containing the microcode to be loaded in the microprocessors during IPL. The base unit feature is installed on the base unit only. Where multiple systems are interconnected and controlled from a central location, each system at each location must have one base unit. Maximum: One per system. Field Installable: No. Note: There are 4 card slots available in each 3728 unit for the following control features.

**Extension Unit Feature (#4002):** Extension units are added to the base unit to provide additional port interface options. Extension units communicate with and are controlled from the base unit. This feature provides the control capability to the extension unit from the base unit. This feature is installed in each extension unit. Maximum: One per extension unit; 15 per system. Field Installation: No.

**Extension Unit Control (#4003):** Provides the capability for all units to be controlled from the base unit. A single control terminal, attached to the base unit, has access to any extension unit within a multi-unit system. Maximum: One per base unit. Field Installation: Yes.

**Mini Cassette Tape Drive (#4004):** Provides the capability of reducing the IPL time in a system with multiple extension units. This feature is installed in the extension unit and is in addition to the mini cassette tape drive installed in the base unit feature. Maximum: One per extension unit. Field Installation: Yes.

**Network Control Interface (#4018):** Provides control for multiple systems connected in a network. Any system located remotely may be controlled from a central location. Each system in the network must have this feature installed in the base unit. The control link between the 3728s may be direct cable attached or leased/switched lines at speeds selectable from 75 to 9600 bps. This feature is also required to connect the PC/XT as the control terminal. Maximum: Two per base unit. Field Installation: Yes.

**Active/Passive Monitoring Switch (#4019):** Provides the capability of permanently connecting one standard test equipment that performs both active testing and passive monitoring functions over a single interface. With this feature, there is no requirement to move the test cable from a 3728 active test port to a 3728 realtime monitor port when switching the test equipment from test to monitor mode.

- Passive monitoring of CCITT V.24/EIA RS-232-C DCE-to-DTE and DTE-to-DTE connections.

- Active testing of: CCITT V.24/EIA RS-232-C DCE equipment connected to a DTE port (#4007). The test equipment must provide a DTE interface. This function requires a DCE port (#4006) dedicated to testing and a realtime monitor port (#4015) for monitoring.
- Active testing and passive monitoring of 4-wire analog interfaces. This function requires an analog port (#4014) dedicated to active testing and an analog real time monitor adapter (#4017) for monitoring.

**Prerequisites:** #4015 and (#4017 for 4-wire analog). **Maximum:** Four per 3728 unit, in conjunction with #4002, #4003 and #4018. **Field Installation:** Yes. **Limitations:** CCITT V.24/EIA RS-232-C interfaces.

- Active testing of DTE equipment connected to DCE ports (#4006) is not supported by this feature. However, this equipment can be tested by directly connecting the test equipment to a DTE port (#4007).
- Attachment of test equipment that provides a DCE interface is not supported. The equipment must be directly connected to a DTE port (#4007).

## PORT INTERFACE FEATURES

**Note:** There are 15 Port card slots available in each 3728 unit for the following features.

**Multi-Unit Switch Communication (#4005):** Provides the capability of moving data from one unit to any other in a multiple, co-located, unit system. The capacity of each feature is 8 communication links, which are allocated according to data rate. Supports CCITT V.24/EIA RS-232-C, CCITT V.35, and 4-wire analog interfaces. Supports CCITT V.24/EIA RS-232-C, CCITT V.35, CCITT X.21, and 4-wire analog interfaces. Maximum: Four per unit. Note: In combination with other port interface features, the maximum number of features allowed per unit is 15. Field Installation: Yes. Limitations: All 3728 units within the co-located system must either have the corresponding number of #4005s installed and must be installed physically adjacent or the corresponding port slot must be left vacant.

**CCITT V.24/EIA RS-232-C DCE (#4006):** Provides eight V.24 DCE ports to attach up to 8 Data Terminal Equipment (DTE) interfaces. Each port switches up to 16 signals. Synchronous and asynchronous operation, with the capability to provide or pass clock, are supported at data rates up to 19.2K bps. The clock speed, set at the plant at 9600 bps, can be changed to 2400, 4800, or 19200 bps in the field by the CE. This feature supports the modem eliminator function by automatically providing the clock when a connection is established between two DCE ports. Maximum: In combination with other port interface features, the maximum number of features allowed per unit is 15. Field Installation: Yes.

**CCITT V.24/EIA RS-232-C DTE (#4007):** Provides eight V.24 DTE ports to attach up to 8 Data Communication Equipments (DCE) interfaces. All other characteristics are identical to #4006.

**CCITT V.35/4 DCE (#4008):** Provides four V.35 DCE ports for attaching up to 4 DTE interfaces. Synchronous operation, with the capability to provide or pass clock, is supported at a maximum data rate of 76.8K bps. The clock speed, set at the plant at 56K bps, can be changed to any bit rate from 19.2K bps to 76.8K bps in the field by the CE. This feature supports the modem eliminator function by automatically providing the clock when a connection is established between two DCE ports. Maximum: In combination with other port interface features, the maximum number of features allowed per unit is 15. Field Installation: Yes.

**CCITT V.35/4 DTE (#4009):** Provides four V.35 DTE ports to attach up to four DCE interfaces. All other characteristics are identical to #4008.

**CCITT V.35/2 DCE (#4010):** Provides two V.35 DCE ports for attaching up to two DTE interfaces at a maximum data rate of 153K bps. The clock speed, set at the plant at 56K bps, can be changed to any bit rate from 19.2K bps to 153K bps in the field by the CE.

**CCITT V.35/2 DTE (#4011):** Provides two V.35 DTE ports for attaching up to two DCE interfaces. All other characteristics are identical to #4010.

**CCITT V.24/EIA RS-232-C DCE - Version D (#4012):** This feature is required in place of #4006 when it has been determined that the specific modem and communication controller environment requires the signal distortion of the 3728 be reduced. All the attachment and speed characteristics of this feature are identical to #4006. Maximum: Seven per 3728 unit. Field Installation: Yes. Limitation: This feature requires two card slots for each #4012 installed in the same 3728 unit.

**CCITT V.24/EIA RS-232-C DTE - Version D (#4013):** This feature is required in place of #4007 when it has been determined that the specific modem and communication controller environment requires the signal distortion of the 3728 be reduced. All the attachment and speed characteristics of this feature are identical to #4007. Maximum: Seven per 3728 unit. Field Installation: Yes. Limitation: This feature requires two card slots for each #4013 installed in the same 3728 unit.

**Analog VF16 (#4014):** Provides 16 4-wire analog line interfaces. The interface conforms to CCITT M102 interface specifications. Maximum: In combination with other port interface features, the maximum number of features allowed per unit is 15. Field Installation: Yes.

**CCITT V.24/EIA RS-232-C Realtime Monitoring (#4015):** Provides the capability for passive realtime monitoring of up to four V.24 lines at up to speeds of 19.2K bps, simultaneously. An RTM (#4015) installed in one unit is capable of monitoring ports in other units (co-located) by using the multiunit switch feature #4005. Maximum: 15 per unit. Field Installation: Yes.

**CCITT V.35 Realtime Monitoring and Test (#4016):** Provides the capability for passive realtime monitoring and active test of up to two V.35 lines simultaneously at speeds up to 153K bps. This feature installed in one unit is capable of monitoring and testing ports in other units (co-located) by using the multiunit feature #4005 at speeds up to 76.8K bps only. Maximum: 15 per unit. Field Installation: Yes.

**Analog Realtime Monitoring Adapter (#4017):** Provides the capability for passive monitoring of analog lines. This feature does not require a port feature slot. Prerequisite: #4015. Maximum: 4 per #4015s installed. Field Installation: Yes.

**CCITT X.21/8 DCE (#4041):** Provides eight X.21 DEC ports for attaching up to eight DTE interfaces. Synchronous operation, with the capability to provide or pass clock, is supported at a maximum data rate of 16K bps. The clock speed, set at the plant at 9.6K bps, can be changed to any bit rate from 9.6K bps to 16K bps in the field by the CE. This feature supports the modem eliminator function by automatically providing the clock when a connection is established between two DCE ports. Maximum: Eight per unit. Field Installation: Yes. Limitation: The Hone Configurator must be used to determine the maximum number of features allowed when used in combination with other port interface features.

**CCITT X.21/8 DTE (#4042):** Provides eight X.21 DTE ports for attaching up to eight DCE interfaces. All other characteristics are identical to #4041.

**CCITT X.21 DCE (#4043):** Provides four X.21 DCE ports for attaching up to four DTE interfaces at a maximum data rate of 32K bps. The clock speed is set at the plant at 19.2K bps. All other characteristics are identical to #4041.

**CCITT X.21/4 DTE (#4044):** Provides four X.21 DTE ports for attaching up to four DCE interfaces. All other characteristics are identical to #4043.

**CCITT X.21/2 DCE (#4045):** Provides two DCE ports for attaching up to two DTE interfaces at a maximum data rate of 64K bps. The clock speed is set at the plant at 48K bps. All other characteristics are identical to #4041.

**CCITT X.21/2 DTE (#4046):** Provides two X.21 DTE ports for attaching up to two DCE interfaces. All other characteristics are identical to #4045.

**CCITT X.21/1 DCE (#4047):** Provides one DCE port for attaching one DTE interface at a maximum data rate of 128K bps. The clock speed is set at the plant at 128K bps. All other characteristics are identical to #4041.

**CCITT X.21/1 DTE (#4048):** Provides one X.21 DTE port for attaching one DCE interface. All other characteristics are identical to #4047.

## CABLE FEATURES

Cables can be ordered from IBM with the machine by Special Feature Codes and are priced separately from the corresponding port feature. The cable lengths indicated are the usable dimensions, i.e., the length outside the connecting machines and do not include the lengths required inside the machines.

Default cable lengths, for each type of external connection, are automatically included as a part of the Hone Configurator, CF3728.

CF3728 HONE configurator provides the capability of changing the cable lengths as requested by the user during the configuration procedures, either at initial order or alteration order time, or for MESS.

If the customer chooses to procure the cables from sources other than IBM, reference should be made to the "IBM 3728 Installation Planning and Configuration Guide", GA27-3641 for the appropriate specifications.

The adapters shipped with the 3725 cable must be removed from the 3725 cable and plugged into the modem end of the 3728 modem cable for attachment to the PTT modems.

Feat No.	Length meters	Interface /Use	Default Cable
DTE PORT to DCE (MODEMS)			
#4021	6.0	V.24	-
#4022	13.5	V.24	x
#4023	35.0	V.24	-
(Japan only>			
#4034	6.0	V.24	-
#4035	13.5	V.24	x
#4036	35.0	V.24	-(<)
#4024	6.0	V.35	x
#4025	13.5	V.35	x
(to 128K bps)			
#4026	35.0	V.35	-
(to 128K bps)			
#4110	6.0	X.21	-
#4111	13.5	X.21	x
#4112	35.0	X.21	-

(Japan only> 3725 cables must be the standard cables instead of the NTT cables. Refer to the M3725 pages for the cable groups to be selected when used in conjunction with cable features #4034, #4035, or #4036.<)

DCE PORT to IBM PC/XT			
#4021	6.0	3725 Primary	x
#4022	13.5	3725 Alternate	-
#4023	35.0	3725 Alternate	x

DTE PORT to 3725 MOSS			
#4027	6.0	3725 Primary	x
#4032	13.5	3725 Alternate	x
#4028	35.0	3725 Alternate	-

NCI PORT to CCITT V.24 Modem			
#4021	6.0		-
#4022	13.5		x
#4023	35.0		-

## MACHINES

NCI PORT to PC/XT (pri. ctrl terminal)  
#4029 6.0 x

NCI PORT to PC/XT (alt. ctrl terminal)  
#4033 13.5 -  
#4030 35.0 x

NCI PORT to NCI PORT  
#4029 6.0 -  
#4033 13.5 -  
#4030 35.0 x

RTM PORT to OEM EQUIP. (local attach)  
#403 1 1.8 x

ASCII PORT (ctrl term. primary)  
#4029 6.0 x

ASCII PORT (ctrl term. alternate)  
#4033 13.5 -  
#4030 35.0 x

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

Accessories are ordered specifying the appropriate part number.

**Direct Attach Kit (P/N 6431166):** Provides the hardware kit required to plug the existing direct attach cables of the 3725. This kit is only required for existing installed 3725 cables. New orders for the 3725 cables do not require this kit.

## SUPPLIES (NONE)

## MACHINES

**3732 TEXT DISPLAY STATION**
**PURPOSE**

Provides a text entry and editing keyboard and display for the 3730 Distributed Office Communication System and the 8100 Information System.

**MODELS**

**Model 1 001**

**Prerequisites:** Either 3791 Controller, mdl 11C, 12A, or 12B, with #9171 installed (refer to M3791 pages for details) or an 8100 Information System with #1501 or #1502 (refer to M8100 pages for details).

**HIGHLIGHTS**

The 3732 consists of a display and keyboard (special feature) that have been designed specifically to provide text entry and editing facilities for the 3730 Distributed Office Communication System and 8100 Information System. The 3732 displays all the text characters that can be entered at the keyboard. In addition, special graphic characters are displayed to denote certain text control functions. The 3732 must be installed with a keyboard.

**Display:** The display is a 15-inch (diagonal) cathode ray tube display providing 24 lines of 80 characters each, to give a total of 1920 characters. For text entry and editing, lines 1 and 24 are reserved for system use, leaving 22 lines for text entry (line 1 displays a scale to indicate character position, and is used to display formatting information such as margin settings and tab stops, and to track cursor position; line 24 is used to display status information). When, with user-programming, the 3732 is used for full-screen processing, the user has control over all 24 lines (except for minor restrictions on the use of lines 1 and 24). The display includes an anti-glare screen.

**Keyboards:** A 77-Key Typewriter Keyboard (#4621) is available as a special feature. Alternatively, in Canada, a 77-Key ASCII Typewriter Keyboard (#4622) is available as a special feature. Both keyboards contain a 48-key text entry section that is similar in layout to typewriter keyboards. This text entry section allows a user to enter up to 96 characters, including upper and lower case characters, and, in addition, accented characters with the Canadian French keyboard. The keyboards also contain 29 function and control keys concerned with document creation, editing, formatting, and printing.

**Text Functions:** The following text entry and editing functions are provided by the 3732:

Automatic new line and word spill (allowing an operator to enter text without being concerned about line endings)

Temporary left margin (providing automatic indentation)

Adjustable right margin

Adjust and no-adjust entry mode

Insert mode

Tabulation (providing normal, decimal, and centering tab stops)

Column tabulation (allowing an operator to enter tabular material column-by-column)

Required characters (new line, space, backspace, hyphen)

Special characters (such as superscripts, subscripts, temporary left margin)

Creation of accented characters using dead keys for certain keyboard languages

Delete character, word

Backspace deletion

Underscore character, word, or group of words (separated by required spaces)

**System Functions:** The following system functions are invoked using function keys on the 3732 keyboard:

Block insert, copy, move, return, delete

Delete line, sentence

Screen advance, return

Page advance, return

Go to End, Go to Top of document

A HELP key to aid users who have problems when operating the 3732.

A PRINT key to send the currently displayed document to a preassigned print queue, for printing as soon as the assigned printer is available.

An ADJUST key to adjust the line length of the currently displayed document and to divide the document into pages.

When attached to the 8100 Information System, the following system functions may be invoked using function keys on the 3732 keyboard: Screen Left ... Screen Right ... Column Edit.

**Additional 3732 functions:**

Cursor-positioning keys to move the display cursor to any position within the display area (up, down, left, right, and "home" - the first available text character position).

An audible alarm tone, similar to the bell on a typewriter, warns an operator that a line or a screen is nearly full (for example, in no-adjust mode the alarm tone sounds when a character is entered or moved into a position five characters from the right margin).

A DISP key to allow or inhibit the display of certain special characters (such as space, and tabs).

**Attachment:** The 3732 attaches to a 3791 Controller mdl 11C, 12A, 12B or to the 8100 Information System with the Display and Printer Attachment via a coaxial cable at a distance up to 609 meters (2,000 feet) or shielded twisted-pair cable at a distance up to 152 meters (500 feet).

**Security And Integrity Features:** A Security Keylock (#6340) helps prevent unauthorized use of the 3732. Text cannot normally be displayed or modified unless the key is in the On position.

**Problem Determination Procedures:** To minimize machine downtime, users are encouraged to determine the cause of 3732 malfunctions using IBM-provided Problem Determination Procedures. Data obtained from these procedures is used to correct customer operating or programming errors, or is passed to a CE to aid in isolating a machine malfunction. The Problem Determination Procedures are presented in an easy-to-follow graphic form and are contained in the 3732 Problem Determination Guide (GA33-3024 without #9610 and GA33-3087 with #9610), which is stored in the Keyboard.

**Publications:** Refer to the latest level of *IBM System/370 Bibliography of Industry Systems and Application Programs* (GC20-0370), for details of 3730 system publications including 3732 on 3730. Refer to *8100 Information System Bibliography* (GC20-8100), for details of publications including 3732 on 8100.

**SPECIFY**

(Canada only→

- Voltage (120V AC, 1-phase, 3-wire, 60 Hz): #9890 for locking plug, or #9891 for non-locking plug. ←)

(Except Canada→

- Power (AC, 1-phase): Specify #2998, and one of the following:

50 Hz	60 Hz
110V #2805	120V #9911
220V #2813	
230V #2821	
240V #2801	←)

- Power Cable Length: If standard 2.8 meter (9 foot) power cable is not required, specify #9513 for 4.5 meter (15 foot) cable.

- Machine Nomenclature (the language of the physical markings on the machine): Specify one of the following:

Canadian French #2935	French #2928
English UK #2927	Spanish #2931
English US #2924	

- Character Set Language: Specify one of the following:

Canadian English #2778	French AZERTY #2764
Canadian French #2777	French QWERTY #2770
English UK #2758	Spanish #2760
English US #2756	

**MACHINES**
**3732 Text Display Station (cont'd)**

- Keyboard Language: When ordering the 77-Key Typewriter Keyboard (#4621), also specify one of the following:  

Canadian English #2978	French AZERTY #2964
Canadian French #2977	French QWERTY #2970
English UK #2958	Spanish #2960
English US #2956	
- Keyboard Layouts: Keyboard layouts are shown in *3730 Distributed Office Communication System: Introduction* (GA33-3021), for 3732 without the 8100 attachment #9610 and in *IBM 3732 Text Display Station for the 8100 Information System Introduction and Configurator* (GA33-3084), for 3732 with #9610.
- 8100 Attachment: #9610 for attachment to 8100 Information System. When thus specified, the 3732 cannot be attached to a 3791 Controller. **Field Installation:** Yes.
- Cables: See "Accessories" for cables... also for cable specifications, when the 3732 is attached to a 3730 System, see *3790 Communication System Installation Manual Physical Planning* (GA27-2769). For cable specifications when the 3732 is attached to an 8100 Information System see *IBM 3732 Text Display Station for IBM 8100 Information System Installation Manual Physical Planning* (GA33-3082).

**SPECIAL FEATURES**

**77-Key Typewriter Keyboard (#4621):** Movable typewriter-like layout, with 48 text entry keys and 29 function and control keys. See "Specify". **Maximum:** One keyboard (#4621). **Field Installation:** Yes. **Prerequisites:** Keyboard Language (see "Specify").

**Security Keylock (#6340):** A lock and key that normally prevent modification or display of the data in the display when the key is in the Off position. For additional or replacement keys, see "Accessories". **Maximum:** One. **Field Installation:** Yes.

**MODEL CONVERSIONS (None)**
**ACCESSORIES**

**Keylock, Keys:** The 3732 with Keylock (#6340) is shipped with two keys. Additional keys may be purchased only from IBM. (Vendor will supply additional keys *only* to original purchaser.) A letter of authorization with key identification number must accompany each order. Specify P/N 2577741. Allow three weeks for delivery.

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted-Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to *IBM Cabling System - Planning and Installation Guide*, GA27-3361. For pricing and ordering information, refer to the Systems Supplies operation within your country.

**Coaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to *IBM 3270 Installation Manual - Physical Planning*, GA27-2787, and *Coaxial Cable and Accessories Manual*, GA27-2805.

Item	Number	Description (Note 1)
ASSM	2577672	Cable Assembly In-Door
BULK	0323921	Coax Wire (Note 2)
P/N	1836418	Connector Kit (Note 2)
ASSM	1833108	Cable Assembly Out-Door
BULK	5252750	Coax Wire (Note 3)
P/N	1836419	Connector Kit (Note 3)
P/N	1833104	Station Protector Kit Carbon (Note 5)
P/N	5252772	Station Protector Element Carbon (Note 7)
P/N	2621414	Modification Kit (Note 4)
P/N	1833106	Station Protector Attachment Kit (Note 6)
P/N	5252643	Adapter (Note 8)
P/N	1830818	Station Protection Kit, Gas (Note 5)
P/N	5252899	Station Protector Element, Gas (Note 7)

**Notes:**

1. Order the above items via MES from Poughkeepsie. Allow a lead time of 120 days.
2. Coax wire and one connector kit (includes two connectors #1836446) required for each indoor cable assembly.
3. Coax wire and one connector kit (includes two connectors #1836447) required for each outdoor cable assembly.
4. Customers replacing 2260 display stations may utilize the existing installed cable by use of this modification kit. One kit required for each cable.
5. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
6. Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
7. Replacement station protector elements.
8. Use to join two #2577672 or two #1833108 cable assemblies together.

**SUPPLIES (None)**



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M 3773.1  
Jul 83

## 3773 COMMUNICATION TERMINAL

[NO LONGER AVAILABLE]

### PURPOSE

This desk-style console-keyboard-printer includes as standard a diskette storage device with removable, reusable diskette. It is a member of the 3770 Data Communication System. Communication features permit operation over switched or nonswitched facilities at speeds up to 4800 bps. It uses the SDLC or BSC transmission technique.

### MODELS

Model 1, P1	001, P01	40 cps average print rate, bidirectional
Model 2, P2	002, P01	80 cps maximum, bidirectional
Model 3, P3	003, P03	120 cps maximum, bidirectional

The prefix "P" on the model number designates user-programmable.

### HIGHLIGHTS

Not applicable for a withdrawn machine.

### SPECIFY

- Power: (AC, 1-phase):
 

50 Hz	60 Hz
100V (#2804)	100V (#2730)
110V (#2805)	115V (#9901)
123.5V (#2811)	200V (#2732)
200V (#2806)	220V (#2803)
220V (#2813)	
235V (#2814)	
- Power Cords: One must be specified.
  - #2760 - 50 Hz cord without plug
  - #2762 - 60 Hz cord without plug
- Color Group: #9041 - Red, #9042 - Yellow, #9043 - Blue, #9045 - Gray. Note: Available at time of manufacture only.
- Machine Nomenclature: One must be specified.
 

English (#2927)	Italian (#2932)
French (#2928)	Japanese (#2930)
German (#2929)	Spanish (#2931)

 Note: Not recommended for field installation.
- Keyboard Arrangement: One must be specified.
 

Brazilian (#2975)	Japanese (#2955)
French (#2970)	Japanese Katakana (#2973)
German (#2957)	Spanish (#2960)
International (#2950)	Spanish Speaking (#2969)
Italian (#2968)	

 Note: Not recommended for field installation.
- Remote Power Off: #9501 ... specify this feature for capability to "power down" terminal from the host CPU using a controlled data sequence over communication facilities.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning*, GA27-3006.

### SPECIAL FEATURES

Special features are on an "As Available" basis for field installation, except #1201 and #4660 which cannot be field installed.

**For communication capability:** Select one Communication feature (#1460, #1461, or #1470); one Communication Driver (#1481 or #1482); and one Integrated Modem (#5500, 5501, 5502 or EIA/CCITT Interface (#3701). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

#### Communication Features

**SDLC/BSC, Switch Control (#1460):** Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Not with #1461 or #1470. See SRL GA27-3097 for BSC compatibility considerations. **Maximum:** One.

**BSC, Point-to-point (#1461):** Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Not with #1460 or #1470. See SRL GA27-3097 for BSC compatibility considerations. **Maximum:** One.

**BSC Multipoint (#1462):** Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See SRL GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** #1460 or #1461.

**SDLC (#1470):** Provides for switched and nonswitched SDLC procedures. **Limitations:** Not with #1460 or #1461. **Maximum:** One.

**Communication Driver Without Business Machine Clocking (#1481):** Provides a communication driver without clocking. **Limitations:** Not with #1482. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

**Communication Driver With 1200 bps Business Machine Clocking (#1482):** Provides communication driver with 1200-bps clocking. Normal/Half speed switch on operator panel allows selection of 1200- or 600-bps operation of the clock. **Limitations:** Not with #1481. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

**CCITT Interface (#3701):** Provides a cable and interface meeting CCITT-V24 characteristics for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations, refer to M2700 Pages. Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds of up to 2400 bps for switched, or up to 4800 bps for nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3901) on an adjacent terminal or on an IBM 3863, 3864, 3872 or 3874 modem. This feature in conjunction with #1482 can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. **Limitations:** Not with 1200 bps Integrated Modem. **Maximum:** One. **Prerequisites:** #1481 or #1482.

**1200 bps Integrated Modem, Nonswitched (#5500):** Provides for point-to-point or multipoint operation over nonswitched communication facilities. Half-speed operation at 600 bps is under manual switch control. **Limitations:** Not with #3701 or with another integrated modem. **Maximum:** One. **Prerequisites:** #1482.

**1200 bps Integrated Modem, WTPSN, Auto Answer (#5501):** Provides for point-to-point operation over public switched telephone network using manual originate/auto answer for establishing connection. Half-speed operation at 600 bps is under manual switch control. **Limitations:** Not with #3701 or with another integrated modem. **Maximum:** One. **Prerequisites:** #1482.

#### Non-Communication Features

**Audible Alarm (#1390):** Sounds an alarm to alert the operator to conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. Refer to "Accessories" for information on additional or replacement keys. **Maximum:** One.

**Keypad, Numeric (#4660):** Provides a keypad in adding machine arrangement to facilitate rapid entry of numeric only data. **Limitations:** Not available for mdls 1, 2 or 3. **Maximum:** One. **Field Installation:** Not recommended. **Prerequisites:** Mdl P1, P2 or P3.

**Operator Identification Card Reader (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 in. x 2-1/8 in. ranging from 0.007 in. to 0.045 in. thick may be read. With a BSC non-programmable terminal, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. For programmable terminal the Operator ID Reader (#5450) is under control of the 3770 application program. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 does not support this feature. **Maximum:** One.

**Storage Increment 4K (#6800):** Provides an additional 4,096 bytes of programmable storage. **Limitations:** Not available for mdls 1, 2 or 3. Not with #6800. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Mdl P1, P2 or P3.



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MACHINES

**3773 Communication Terminal (cont'd)**

**Storage Increment 8K (#6801):** Provides an additional 8,192 bytes of programmable storage. **Limitations:** Not available for mdls 1, 2 or 3. Not with #6800. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** Mdl P1, P2 or P3.

**Variable Width Forms Tractor (#8700):** Provides a forms feeding device for continuous edge-punched forms. Overall forms width from 3.0 to 15.0 in. can be accommodated. Refer to *Forms Design Reference Guide for Printers*, GA24-3488. **Maximum:** One.

**MODEL CONVERSIONS (None)**

The Following Table Has Been Revised:

**TERMS and CONDITIONS**

Plan Offering: Plan B	Educational Allowance: Yes
Purchase Option: 50 %	Pre-Installation Test Allowance: Per
Machine Group: D	host processor establishment per
Per Call: 1	country = 12 hours (first unit
Warranty: B	only)

**ACCESSORIES**

The following items are available on a purchase only basis.

**Forms Stand (#4450):** A two-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing.

**Locks and Keys:** Keylock (#4650) is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization must accompany each order.

**SUPPLIES (None)**

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M 3773.2

Jul 83

## 3774 COMMUNICATION TERMINAL

[NO LONGER AVAILABLE]

### PURPOSE

This desk-style console-keyboard-printer is a member of the 3770 Data Communication System. The basic printer operates at a maximum speed of 80 or 120 characters per second and prints bidirectionally, serially by character, using a wire-matrix print head. Special features permit one or two diskette storage devices and provide for the attachment of an additional printer, the 3784 Line Printer, and one card reader and one card punch. One of three card readers can be selected for operation at speeds of 50, 150, or 300 cards per minute. The card punch operates at 50 cards per minute.

Communication features allow for operation over switched or non-switched facilities at speeds of up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

### MODELS

Model 1	001,	80 cps maximum, bi-directional printer
Model 2	002,	120 cps maximum, bi-directional printer

### HIGHLIGHTS

**Keyboard:** All countries except Japan Katakana use EBCDIC arrangement with 47 data keys (produces 94 characters). Japan Katakana uses 48 data keys in EBCDIC arrangement (produces 128 characters). Underscore/Hyphen, Backspace, Space and "Print Character" keys have typamatic operation. Typamatic operation is provided for Backspace, Space, Tab, New Line, and "Print Character" (models) keys. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.

**Printer:** Prints serially by character at a maximum rate of 80 or 120 characters per second while the wire-matrix print head is moving in either direction: Bidirectional printing. Print span is 132 positions at 10 characters per inch. Line spacing is 6 lines per inch. Single-part continuous forms or cut forms of up to three parts can be handled with the standard friction feed platen. A variable-width forms tractor, available as a special feature, is required for feeding multipart or preprinted continuous forms of up to six parts maximum (total thickness not greater than 0.018 in.). Five- and six-part continuous forms should be tried on an individual basis for acceptable feeding, registration, and print quality. Overall form widths of from 3.0 in. to 15.0 in. can be accommodated. To facilitate handling of continuous forms, the Forms Stand (See "Accessories") is recommended. Card stock continuous forms are not recommended. Refer to GA24-3488 for forms design considerations. A 94-character set is standard. (128-character Katakana set is provided when Katakana keyboard is specified.)

**Performance Considerations:** Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See *IBM 3770 Data Communication System*, GA27-3097, for additional information.

**Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem identification and recovery routines and procedures that are easily understood and used by the operator. See *IBM 3774/3775 Operating Procedures Guide*, GA27-3094 or *IBM 3773, 3774, and 3775 Programmable Communication Terminals Operator's Guide*, GA27-3114.

**Communications:** See "Special Features". Transmission over switched or nonswitched facilities at speeds of up to 4800 bps are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on Customer Responsibilities, Communication Facilities, and other attachment information, and to M3872 pages.

The 2400 bps Integrated Modem and IBM 3872 Modem, when appropriately configured, can be intermixed on the same communication facility. The 1200 bps Integrated Modem and IBM 3976 mdl 3 Modem, when appropriately configured, can be intermixed on the same communication facility. (Japan only) NTT and other non-IBM modems can be attached via the CCITT feature.

### Prerequisites:

**For SDLC Communications with S/370 or 4300 Processor:** A 3704, 3705, or 3725 Communications Controller operating under Network Control Program/Virtual Storage (NCP/VS) attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1, or OS/VS2, or these operating systems running under VM/370.

**For BSC Communications with S/360, S/370 or 4300 Processors:** A virtual storage S/370 or 4300 processor operating under DOS/VS, OS/VS1 or OS/VS2, or under RSCS and VM/370, or any of these operating systems running under VM/370. The 3770 Communication Terminals use 2770 BSC programming support when operating in BSC mode. Operation with S/360, S/370, or 4300 processors using 2770 BSC programming is also permitted. The customer may have to modify existing 2770 application programs. See GA27-3097 for BSC compatibility considerations. BSC attachment can be made via a 3704, 3705, or 3725 Communications Controller or a 2701 Data Adapter Unit attached to a channel of any virtual storage S/370 or 4300 processor or via an Integrated Communications Adapter on S/370; or via a Communications Adapter feature on the 4331 or 4361 processor. BSC attachment can be made via a 3704/3705 Communications Controller attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75, and 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in 65 mode), 75, and 195; or via an Integrated Communications Attachment on S/360 mdl 25. Note: The 3725 is not connectable to S/360.

### HIGHLIGHTS - With Emulator

**Dual 256-Byte Buffers:** Transfer data between the input and output devices. The buffers alternate in providing input and output service to permit overlapped operation.

**Buffer Edit:** Allows corrections to be made on the contents of a buffer during key entry jobs. A 256-byte diskette record, if the diskette feature is present, can also be retrieved into the buffer using Update Mode and be corrected using buffer edit functions. Corrections can be made by character, by line, or by entire buffer (up to 256 bytes).

**Extend Buffer:** Combines the dual 256-byte buffers into a single 512-byte buffer under operator control for keyboard-to-line or keyboard-to-diskette jobs. Buffer edit capability applies to the full 512 bytes. Buffer transfers to line or diskette are in 256-byte increments and cannot be overlapped.

**Printer Format Controls:** Facilitates the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Format controls for up to five jobs can be entered from keyboard, or from diskette or card if either one of these devices is attached.

**Compression/Expansion:** Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards. A 2-byte sequence is substituted for each occurrence of three or more consecutive blank card columns (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 64 consecutive blank columns are read. The terminal monitors the non-transparent data received that is destined for printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks. A similar capability is provided when using SDLC procedures.

**Auto Interrupt:** Allows the terminal to automatically interrupt an offline job for an online job initiated by the host processor. The terminal stops the offline job, executes the online job for receiving line data, and automatically restarts the offline job without operator intervention. A manual switch on the keyboard enables/disables this mode of operation. See "Operating Characteristics-Automatic Interrupt" in *3770 System Components Manual*, GA27-3097.

**Input/Output Job Definitions:** Can be operator- or terminal-defined. Up to five operator-defined jobs can be read from diskette or card reader to facilitate rapid job set-up when the terminal is equipped with either of the special features; otherwise they can be entered from keyboard under control of a prompting sequence and executed from temporary storage. Printer format controls can be part of the job definition. An appropriately configured 3774 will permit input/output job designations as follows:

**3774 Communication Terminal (cont'd)**

Input	Output
Offline Jobs	
Keyboard <sup>1</sup>	Console Printer, Diskette, Card Punch, or Printer Second
Diskette <sup>2</sup>	Console Printer, Diskette, Card Punch, or Printer Second
Card Reader <sup>2</sup>	Console Printer, Diskette, Card Punch, or Printer Second
Keyboard & Diskette <sup>3</sup>	Console Printer & either Diskette or Card Punch
Keyboard and Card Reader <sup>3</sup>	Console Printer & either Diskette or Card Punch
Online Batch Jobs	
Diskette or Card Reader <sup>2</sup>	Line
Line <sup>2</sup>	Console Printer, Diskette, Card Punch, or Printer Second
Online Interactive Jobs	
Keyboard <sup>1</sup>	Line
Line	Console Printer

**Notes:**

- <sup>1</sup> One input and one output device per job. Output-to-console printer is automatic when input is keyboard.
- <sup>2</sup> One input device and one output device per job. Monitor print is an additional output option when Diskette, Card Punch, or Line is the output device.
- <sup>3</sup> Record Format feature (#6010) is required in addition to I/O devices to allow multiple input and output devices for a job.

**Limitations:** The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard and console printer are standard. For other configurations, refer to "Special Features" below.

**Publications:** GC20-0001

**SPECIFY**

- Power (AC, 1-phase): One must be specified.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	220V #2803
220V #2813	
235V #2814	

**Power Cord:** One must be specified.

#2760 - 50 Hz cord without plug.  
#2762 - 60 Hz cord without plug.

- Color: One must be specified. #9041 for Red, #9042 for Yellow, #9043 for Blue, #9045 for Gray. Note: Available at time of manufacture only.
- Remote Power Off (#9501): Specify this feature for capability to "power down" terminal from the host processor using a controlled data sequence sent over communication facilities.
- Cabling: Fixed-length cables are supplied as standard. Refer to *Installation Manual-Physical Planning*, GA27-3006.
- Machine Nomenclature: #2930 - Japanese
- Keyboard Arrangement: One must be specified. Note: Not recommended for field installation.
  - #2950 - International
  - #2955 - Japan
  - #2957 - Germany
  - #2960 - Spain
  - #2968 - Italy
  - #2969 - Spanish Speaking
  - #2970 - France
  - #2973 - Japan Katakana
  - #2975 - Brazil

**SPECIAL FEATURES**

All special features are on an "As Available" basis for field installation, except Keypad feature (#4660) for which field installation is not recommended.

**COMMUNICATIONS FEATURES**

**For Communication Capability:** Select one from each group:

- One Communication Feature (#1460, #1461 or #1470)\*
- One Communication Driver (#1481 or #1482)
- EIA/CCITT Interface (#3701), X.21 Adapter for Nonswitched Networks (#5655) or One Integrated Modem (#5500, #5600, #5602, or #2881).

\* #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

**SDLC/BSC, Switch Control (#1460):** Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. **Limitations:** Not with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

**BSC, Point-To-Point (#1461):** Provides for point-to-point BSC operation over switched or nonswitched facilities. **Limitations:** Not with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. **Maximum:** One.

**BSC, Multipoint (#1462):** Required for BSC multipoint operation over nonswitched facilities. **Limitations:** See GA27-3097 for BSC compatibility considerations. **Maximum:** One. **Prerequisites:** #1461 or #1460.

**SDLC (#1470):** Provides for switched and nonswitched SDLC procedures. **Maximum:** One. **Limitations:** Not with #1460 or #1461.

**Without Business Machine Clocking (#1481):** Provides communication driver without clocking. **Limitations:** Not with #1482. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

**With 1200 bps Business Machine Clocking (#1482):** Provides communication driver with 1200 bps clocking. Normal/half-speed switch on operator panel allows selection of 1200 or 600 bps operation of the clock. **Limitations:** Not with #1481. **Maximum:** One. **Prerequisites:** #1460, #1461, or #1470.

**EIA/CCITT Interface (#3701):** Provides a CCITT interface and cable for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages. Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds of up to 4800 bps for switched and nonswitched operation are permitted. This feature, in combination with #1481, can be used to attach to Modem Fan-Out (#3901) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. This feature, in combination with #1482, can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. **Limitations:** Not with Integrated Modem features. Not with X.21 Adapter for Nonswitched Networks (#5655). **Maximum:** One. **Prerequisites:** #1481 or #1482. Note: In Japan, Specify Code #2946 must be supplied to satisfy the NTT's DTE Self-test requirements when attaching a non-IBM modem.

**2400 bps Integrated Modem, Switched, Caducee Network (#2881):** This self-clocked modem provides for point-to-point operation over the Caducee switched network. Operator controls provide for half-speed operation and Talk/Data. **Limitations:** Not with CCITT Interface (#3701 or #3655), or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481.

**1200 bps Integrated Modem, Nonswitched (#5500):** Provides for point-to-point or multipoint operation over nonswitched communication facilities. Half-speed operation at 600 bps is under manual switch control. **Limitations:** Not with #3701, #5655 or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1482. (Japan only - also specify #2943 for NTT D-1 Service Connection. +)

**2400 bps Integrated Modem, Nonswitched Point-To-Point (#5600):** This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. **Limitations:** Not with #3701, #5655 or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481. (Japan only - also specify #2943 for NTT D-1 Service Connection. +)



## 3774 Communication Terminal (cont'd)

**2400 bps Integrated Modem, Nonswitched Multipoint (#5602):** This self-clocked modem provides for multipoint operation over non-switched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. **Limitations:** Not with #3701, #5655 or with another Integrated Modem. **Maximum:** One. **Prerequisites:** #1481. For Japan only: also specify #2943 for NTT D-1 Service Connection.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides a cable and interface meeting CCITT-X.21 characteristics for attachment of data communication equipment. Feature operates only over Non-switched lines using SDLC procedures. Speeds of 2400 or 4800 bps are permitted. **Limitations:** 1) Japan DDC Nonswitched Network only. 2) Not with #3701. 3) Not with Integrated Modem features. **Maximum:** One. **Prerequisites:** #1481 and #1470.

**Modem Fan-Out (#3901):** [2400 bps Integrated Modem] Equips the 2400 bps Integrated Modem, Nonswitched Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. **Limitations:** This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. **Maximum:** One. **Prerequisites:** #5602.

## NON-COMMUNICATIONS FEATURES

**Audible Alarm (#1390):** Sounds an alarm to alert the operator to conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. **Maximum:** One.

**Door Keylock (#3401):** [Single use charge] Provides one keylock and two keys for the desk-console door. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One.

**Door Keylocks, Dual (#3402):** [Single use charge] Provides two keylocks and four identical keys for both desk-console cabinet doors. **Limitations:** The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. **Maximum:** One. **Prerequisites:** #4902.

**Keylock (#4650):** [Single use charge] Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. See "Accessories" for information on additional or replacement keys. **Maximum:** One.

**Diskette Storage, First (#4901):** One device with a customer-removable diskette is placed in the left cabinet. Additional diskettes are available. Characteristics of the diskette storage device are: one movable read/write head, one read/write surface, 73 data tracks, 26 sectors per track, and 128 bytes per sector. Up to 949 256-byte records can be stored on the diskette (one 256-byte data record is reserved for job identification information in 3774 mdl 1 and 2.). Each 256-byte record is stored in two consecutive numbered sectors in interchange mode, or in two non-consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode (3774 mdl 1 and 2). An Update Switch on the 3774 mdl 1 and 2 provides the operator with the capability of reading a 256-byte diskette record into the terminal buffer where it can be printed, edited, or deleted. **Maximum:** One.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the first (#4901). It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for:

- **Copy:** Data can be copied from diskette 1 to diskette 2 (single data set or all active data sets.)
- **Concatenate (pool):** The ability to concatenate on a data set basis.
- **Continue:** Allows a read or write operation to automatically continue to diskette 2 if it has been placed in a ready condition. Continue is not allowed while keying data.
- **Record Update:** Allows a record to be read into the buffer from diskette 1, updated from keyboard, and written to the other diskette.
- Record Format feature (#6010) is a prerequisite for this update capability.

**Maximum:** One. **Field Installation:** Yes. Color will be the same as that specified for the base machine. **Prerequisites:** #4901.

**Operator Identification Card Reader (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 in. x 2-1/8 in. ranging from 0.007 to 0.045 in. thick may be read. With a BSC non-programmable terminal, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. **Limitations:** (1) The operator must position and slide the card through the reader-slot at a steady rate between 5.0 in. and 40.0 in. per second for a read operation. (2) BSC programming for 2770 does not support this feature. **Maximum:** One.

**Record Format (#6010):** Provides an offline capability for constructing records using more than one input and output device. Input can be keyboard, and either diskette or an attached card reader. Output can be console printer, and either diskette or an attached card punch. A record format specification record stored on diskette can be defined and changed by the user to permit selection, by field, for merging or creating, in any sequence within a transaction cycle. It also permits selecting output by field. There may be multiple fields within a transaction and multiple transaction cycles within a job. Provision is also made with this feature for self-checking, decimal insertion, right justify and fill, and numeric checking. A record format specification record can be loaded to diskette from the line, keyboard, or card reader. This feature increases the size of "extend buffer" from 512 to 2,048 bytes. **Limitations:** Extend buffer and update operation is not permitted for a record format job. A record format job cannot be interrupted by the processor automatically; operator intervention is required. **Maximum:** One. **Prerequisites:** #4901.

**3501 Card Reader Attachment (#8050):** Provides for attachment of the 3501 Card Reader. **Limitations:** Not with 3782/2502 Card Reader Attachment (#8149). **Maximum:** One.

**3782/2502 Card Reader Attachment (#8149):** Provides for the attachment of the 3782 Card Attachment Unit mdl 2 and 2502 Card Reader mdl A1 or A2. The 2502 can be equipped with special features for 51/80 or 66/80 column cards and/or Optical Mark Read. A companion Optical Mark Read special feature is required on the 3782 mdl 2. **Limitations:** Not with 3501 Card Reader Attachment (8050). **Maximum:** One.

**3782/3521 Card Punch Attachment (#8150):** Provides for attachment of the 3782 Card Attachment Unit mdl 1 and the 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print or Card Print Katakana. **Limitations:** If a 2502 or 3501 Card Reader is also attached (#8149 or #8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. **Maximum:** One.

**3784 Printer Attachment (#8155):** Provides for the attachment of the 3784 Line Printer as a second printer. **Maximum:** One.

**Variable-Width Forms Tractor (#8700):** Provides a forms feeding device for continuous edge-punched forms. Overall forms width from 3.0 in. to 15.0 in. can be fed. Refer to *Forms Design Reference Guide for Printers*, GA24-3488. **Maximum:** One.

## MODEL CONVERSIONS

Are field installable and are on an "As Available" basis.

## ACCESSORIES

**Forms Stand (#4450):** A 2-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing. For shipment with the machine, order by feature number.

**Locks and Keys:** The Keylock #4650 special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order.

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136653, or equivalent, is required. Contact IBM.

**3775 COMMUNICATION TERMINAL****PURPOSE**

This desk-style console-keyboard-printer is a member of the 3770 Data Communication System. The basic printer operates at a maximum speed of 120 lines per minute using a 64-character set or 80 lines per minute using a 94-character set or 40 lines per minute using a 128-character set. An engraved character font print belt can be interchanged by the operator. Special features permit one or two diskette storage devices and provide for the attachment of one card reader and one card punch. One of three card readers may be selected for operation at a speed of 50, 150, or 300 cards per minute. The card punch operates at 50 cards per minute.

Communication features allow for operation over switched or non-switched facilities at speeds of up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

**MODELS**

**Model 1 001:** (NO LONGER AVAILABLE) (Non-programmable): 80/120 lpm printer (40 lpm with Katakana)

**HIGHLIGHTS**

- **Keyboard:** All countries except Japan Katakana use EBCDIC arrangement with 47 data keys (produces 94 characters). Underscore/Hyphen, Backspace, Space and "Print Character" keys have typamatic operation. Japan Katakana uses 48 data keys in EBCDIC arrangement (produces 128 characters). Typamatic operation is provided for Backspace, Space, Tab, New Line, and "Print Character" keys. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.
- **Printer:** During a key entry job, the print platen lowers to provide print line visibility. Printing is from characters engraved on a revolving print belt. Included as standard is one interchangeable print belt (either 64- or 94-character set) or one operator interchangeable 128-character Katakana set with the Japanese 64-character layout as a subset. Therefore, in the latter case, with the 64-character set belt mounted on a Katakana machine, a corresponding increase in throughput will result. Also included are a variable-width forms tractor for feeding continuous forms up to 15 inches overall width, paper jam detection, and 132 print positions. Character spacing is 10 per inch; line spacing is 6 or 8 per inch. Maximum print speed is 120 lines per minute with the 64-character set or 80 lines per minute with the 94-character set or 40 lines per minute using a 128-character set. Continuous card stock forms are not recommended. Refer to GA24-3488 for forms design considerations.
- **Performance Considerations:** Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See IBM 3770 Data Communication System, GA27-3097, for additional information.
- **Problem Determination Procedures:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done through the use of problem identification and recovery routines and procedures that are easily understood and used by the operator. See IBM 3775/3775 Operating Procedures Guide, GA27-3094 or IBM 3773, 3774, and 3775 Programmable Communications Terminals Operator's Guide, GA27-3114.
- **Communications:** See "Special Features".

Transmission over switched or nonswitched facilities at speeds up to 4800 bps are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on Customer Responsibilities, Communication Facilities, and other attachment information, and to M3872 and 3874 pages.

The 2400 bps Integrated Modem and 3872 Modem, when appropriately configured, can be intermixed on the same communication facility. The 1200 bps Integrated Modem and 3976 mdl 3 Modem, when appropriately configured, can be intermixed on the same communication facility. (Japan only > NTT and other non-IBM modems can be attached via the CCITT feature. <)

**Prerequisites:** For SDLC Communications with S/370 or 4300 Processor: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program/Virtual Storage (NCP/VS) attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1, or OS/VS2; or these operating systems running under VM/370.

For BSC Communications with S/360, S/370 or 4300 Processors: A virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2, and VM/370, or any of these operating systems running under VM/370. The 3770 Communication Terminals use 2770 BSC programming support when operating in BSC mode. Operation with S/360, S/370 or 4300 Processors using 2770 BSC programming is also permitted. The customer will have to modify existing application programs for operation with programmable models of the 3775. See GA27-3097 for BSC compatibility considerations. BSC attachment can be made via a 3704, 3705, or 3725 Communications Controller or a 2701 Data-Adapter Unit attached to a channel of any virtual storage S/370 or 4300 Processor; or via an Integrated Communications Adapter on S/370 processor; or via a Communications Adapter feature on a 4331 or 4361 processor. BSC attachment can be made via a 3704/3705 Communications Controller attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in mdl 65 mode), 75, and 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in mdl 65 mode), 75, and 195; or via an Integrated Communications Attachment on S/360 mdl 25. Note: The 3725 is not connectable to S/360.

**HIGHLIGHTS - WITH EMULATOR**

- **Dual 256-Byte Buffers:** Transfer data between the input and output devices. The buffers alternate in providing input and output service to permit overlapped operation.
- **Buffer Edit:** Allows corrections to be made on the contents of a buffer during key entry jobs. A 256-byte diskette record, if the diskette feature is present, can also be retrieved into the buffer using Update Mode and be corrected using buffer edit functions. Corrections can be made by character, by line, or by entire buffer (up to 256 bytes).
- **Extend Buffer:** Combines the dual 256-byte buffers into a single 512-byte buffer under operator control for keyboard-to-line or keyboard-to-diskette jobs. Buffer edit capability applies to the full 512 bytes. Buffer transfers to line or diskette are in 256-byte increments and cannot be overlapped.
- **Printer Format Controls:** Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Format controls for up to five jobs can be entered from keyboard, or from diskette or card if either one of these devices is attached.
- **Compression/Expansion:** Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards. A 2-byte sequence is substituted for each occurrence of three or more consecutive blank card columns (63 consecutive blanks is the upper limit).

A second 2-byte sequence is appended if more than 64 consecutive blank columns are read. The terminal monitors the non-transparent data received that is destined for printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks. A similar capability is provided when using SDLC procedures.

- Auto Interrupt: Allows the terminal to automatically interrupt an offline job for an online job initiated by the host processor. The terminal stops the offline job, executes the online job for receiving line data, and automatically restarts the offline job without operator intervention. A manual switch on the keyboard enables/disables this mode of operation. See "Operating Characteristics-Automatic Interrupt in 3770 System Components Manual", GA27-3097.
- Input/Output Job Definitions: Can be operator-or terminal-defined. Up to five operator-defined jobs can be read from diskette or card reader to facilitate rapid job setup when the terminal is equipped with either of the special features; otherwise they can be entered from keyboard under control of a prompting sequence and executed from temporary storage. Printer format controls can be part of the job definition. An appropriately configured 3775 will permit input/output job designations as follows:

Input	Output
Offline Jobs	
Keyboard (1)	Console Printer, Diskette, or Card Punch
Diskette (2)	Console Printer, Diskette, or Card Punch
Card Reader (2)	Console Printer, Diskette, or Card Punch
Keyboard and Diskette (3)	Console Printer and either Diskette or Card Punch
Keyboard and Card Reader (3)	Console Printer and either Diskette or Card Punch
Online Batch Jobs	
Diskette or Card Reader (2)	Line
Line(2)	Console Printer, Diskette, or Card Punch
Online Interactive Jobs	
Keyboard (1)	Line
Line	Console Printer

Notes:

1. One input and one output device per job. Output-to-console printer is automatic when input is keyboard.
2. One input device and one output device per job. Monitor print is an additional output option when Diskette, Card Punch, or Line is the output device.
3. Record Format (#6010) is required in addition to I/O devices to allow multiple input and output devices for a job.

Limitations: The input/output capabilities outlined under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard and console printer are standard. For other configurations, refer to "Special Features" below.

Bibliography: GC20-0001

SPECIFY

- Power (AC, 1-phase): One must be specified.
 

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	220V #2803
220V #2813	
235V #2814	
- Power Cords: One must be specified.
  - #2760 - 50 Hz cord without plug.
  - #2762 - 60 Hz cord without plug.
- Color: One must be specified. #9041 for Red, #9042 for Yellow, #9043 for Blue, #9045 for Gray.
 

Note: Available at time of manufacture only.
- Remote Power Off (#9501): Specify this feature for capability to "power down" terminal from the host processor using a controlled data sequence sent over communication facilities.
- Cabling: Fixed-length cables are supplied as standard. Refer to "Installation Manual-Physical Planning", GA27-3006.
- Machine Nomenclature:
  - #2930 - Japanese

Note: Not recommended for field installation.
- Keyboard Arrangement: One must be specified.
  - #2950 - International
  - #2955 - Japan
  - #2957 - Germany
  - #2958 - English UK
  - #2960 - Spain
  - #2968 - Italy
  - #2969 - Spanish Speaking
  - #2970 - France
  - #2973 - Japan Katakana
  - #2975 - Brazil

Note: Not recommended for field installation.
- Print Belt Character Set: One must be specified. Available at time of manufacture only. See Print Belt under "Accessories" for additional print belts.
  - #2768 for 64-Character Set, 2769 for 94-Character Set. #2873 for 128-Character Set (Japan Katakana - requires #2973).

SPECIAL FEATURES

All special features are on an "as available" basis for field installation, except Keypad feature (#4660) and Dual Independent Forms Feed (#3551) for which field installation is not recommended.

COMMUNICATIONS FEATURES

For communication capability, select one from each group:

- One Communication Feature (#1460, #1461 or #1470)\*
- One Communication Driver (#1481 or #1482)

- EIA/CCITT Interface (#3701), X.21 Adapter for Nonswitched Networks (#5655) or One Integrated Modem (#5500, #5600, #5602, or #2881).

\* #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

**SDLC/BSC, Switch Control (#1460):** Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. Limitations: Not with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One.

**BSC, Point-To-Point (#1461):** Provides for point-to-point BSC operation over switched or nonswitched facilities. Limitations: Not with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One.

**BSC, Multipoint (#1462):** Required for BSC multipoint operation over nonswitched facilities. Limitations: See GA27-3097 for BSC compatibility considerations. Maximum: One. Prerequisites: #1461 or #1460.

**SDLC (#1470):** Provides for switched and nonswitched SDLC procedures. Maximum: One. Limitations: Not with #1460 or #1461.

**Without Business Machine Clocking (#1481):** Provides communication driver without clocking. Limitations: Not with #1482. Maximum: One. Prerequisites: #1460, #1461, or #1470.

**With 1200 bps Business Machine Clocking (#1482):** Provides communication driver with 1200 bps clocking. Normal/half-speed switch on operator panel allows selection of 1200 or 600 bps operation of the clock. Limitations: Not with #1481. Maximum: One. Prerequisites: Communication Feature #1460, #1461, or #1470.

**EIA/CCITT Interface (#3701):** Provides a CCITT interface and cable for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages. Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds of up to 4800 bps for switched and nonswitched operation are permitted. This feature, in combination with #1481, can be used to attach to Modem Fan-Out (#3901) on an adjacent terminal, or on 3863, 3864, 3872 or 3874 Modem. This feature in combination with #1482 can be used for direct attachment to a 3704 or 3705 equipped with Local Attachment (#4716) for operation at 1200 bps synchronous. Limitations: Not with Integrated Modem features. Not with X.21 Adapter for Nonswitched Networks (#5655). Maximum: One. Prerequisites: #1481 or #1482. (Japan only > Specify Code #2946 must be supplied to satisfy the NTT's DTE Self-test requirements when attaching a non-IBM modem.<)

**Modem Fan-Out (#3901):** Equips the 2400 bps Integrated Modem, Nonswitched Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. Limitations: This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. Maximum: One. Prerequisites: #5602.

**1200 bps Integrated Modem, Nonswitched (#5500):** Provides for point-to-point or multipoint operation over nonswitched communication facilities. Half-speed operation at 600 bps is under manual switch control. Limitations: Not with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1482. (Japan only > also specify #2943 for NTT D-1 Service Connection.<)

**2400 bps Integrated Modem, Nonswitched Point-To-Point (#5600):** This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. Limitations: Not with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection.<)

**2400 bps Integrated Modem, Nonswitched Multipoint (#5602):** This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. Limitations: Not with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisite: #1481. (Japan only > Also specify 2943 for NTT D-1 Service Connection.<)

**X.21 Adapter For Nonswitched Networks (#5655):** Provides a cable and interface meeting CCITT X.21 characteristics for attachment of data communication equipment. Feature operates only over Non-Switched lines using SDLC procedures. Speeds of 2400 or 4800 bps are permitted. Limitations: 1) Japan DDC Non-Switched Network only. 2) Not with #3701. 3) Not with Integrated Modem features. Maximum: One. Prerequisites: #1481 and #1470.

## NON-COMMUNICATIONS FEATURES

**Audible Alarm (#1390):** Sounds an alarm to alert the operator to conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One.

**Door Keylock (#3401):** (SUC) Provides one keylock and two keys for the desk-console door. Limitations: The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One.

**Door Keylocks, Dual (#3402):** (SUC) Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One. Prerequisite: #4902.

**Keylock (#4650):** (SUC) Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with this feature. See "Accessories" for information on additional or replacement keys. Maximum: One.

**Diskette Storage, First (#4901):** One device with a customer-removable diskette is placed in the left cabinet. Additional diskettes are available. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head, one read/write surface, 73 data tracks, 26 sectors per track, and 128 bytes per sector. Up to 949 256-byte records can be stored on the diskette (one 256-byte data record is reserved for job identification information in 3775). Each 256-byte record is stored in two consecutive numbered sectors in interchange mode, or in two non-consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode mdl 1. An Update Switch on the 3775 provides the operator with the capability of reading a 256-byte diskette record into the terminal buffer where it can be printed, edited, or deleted. Maximum: One.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the first (#4901). It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for:

- Copy: Data can be copied from Diskette 1 to Diskette 2 (single data set or all active data sets.)
- Concatenate (pool): The ability to concatenate on a data set basis.
- Continue: Allows a read or write operation to automatically continue to Diskette 2 if it has been placed in a ready condition. Continue is not allowed while keying data.
- Record Update: Allows a record to be read into the buffer from Diskette 1, updated from keyboard, and written to the other diskette.
- Record Format (#6010): Prerequisite for this update capability.

Maximum: One. Field Installation: Yes. Color will be the same as that specified for the base machine. Prerequisite: #4901.

**Operator Identification Card Reader (#5450):** Provides for reading magnetic stripe cards encoded to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 inches x 2-1/8 inches ranging from 0.007 to 0.045 inches thick may be read. Contact IBM for magnetically striped and encoded identification cards. With a BSC non-programmable terminal, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. Limitations: (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 does not support this feature. Maximum: One.

**Record Format (#6010):** Provides an offline capability for constructing records using more than one input and output device. Input can be keyboard, and either diskette or an attached card reader. Output can be console printer, and either diskette or an attached card punch. A record format specification record stored on diskette can be defined and changed by the user to permit selection, by field, for merging or creating, in any sequence within a transaction cycle. It also permits selecting output by field. There may be multiple fields within a transaction and multiple transaction cycles within a job. Provision is also made with this feature for self-checking, decimal insertion, right justify and fill, and numeric checking. A record format specification record can be loaded to diskette from the line, keyboard, or card reader. This feature increases the size of "extend buffer" from 512 to 2,048 bytes. Limitations: Extend buffer and update operation is not permitted for a record format job. A record format job cannot be interrupted by the processor automatically; operator intervention is required. Maximum: One. Prerequisite: #4901.

**3501 Card Reader Attachment (#8050):** Provides for attachment of the 3501 Card Reader. Limitations: Not with 3782/2502 Card Reader Attachment (#8149). Maximum: One.

**3782/2502 Card Reader Attachment (#8149):** Provides for the attachment of the 3782 Card Attachment Unit mdl 2 and 2502 Card Reader mdl A1 or A2. The 2502 can be equipped with special features for 51/80 or 66/80 column cards and/or is required on the #3782 mdl 2. Limitations: Not with 3501 Card Reader Attachment (#8050). Maximum: One.

**3782/3521 Card Punch Attachment (#8150):** Provides for attachment of the 3782 Card Attachment Unit mdl 1 and the 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print or Card Print Katakana. Limitations: If a 2502 or 3501 Card Reader is also attached (#8149 or #8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

Accessories are available on a purchase-only basis. For shipment with machine, order feature numbers indicated below.

**Forms Stand (#4450):** A 2-shelf forms stand that permits placement of continuous forms (out of carton) on stand above floor level and provides for stacking after printing. For shipment with the machine, order by feature number. Note: For the 3775, it is recommended that forms be used out of carton.

**Locks and Keys:** The Keylock #4650 special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order.

**Print Belt:** A metal belt with engraved font. Available in EBCDIC character arrangement for the countries listed in the table below. Character set sizes of 64 or 94 (96 positions of which 94 are printable) are available. See "Specify" for restrictions or limitations. The belt can be interchangeably used with the one provided on the machine. Order must contain two feature numbers, one from Table A and one from Table B.

Table A - Character Set Size

#2798	-	64-character set
#2799	-	94-character set

Table B - Country Arrangement

#2975 - Brazil	#2968 - Italy
#2977 - Canada (French)	#2955 - Japan (English)
#2956 - English US	#2973 - Japan (Katakana)
#2958 - English UK	#2960 - Spain
#2970 - France	#2969 - Spanish Speaking
#2957 - Germany	#2953 - Text Print EBCDIC
#2950 - International	(English US only)

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136634 (No Longer Available) , or equivalent, is required. Contact IBM.

## 3776 COMMUNICATION TERMINAL MODELS 1, 2

### THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

#### PURPOSE

The 3776 is a medium-speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776 mdls 1 and 2 are SNA Single Logical Unit (SLU) and BSC terminals. A keyboard is used for terminal control and for operator communication with the host processor. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, 94 or 127-character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 50, 150 or 300 cards per minute. The card punch operates at 50 cpm.

Communication features permit operation over switched or non-switched facilities at speeds up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

#### MODELS 1, 2

##### Model 1 001

Maximum LPM	Character Set
300	48
230	64
160	94
80	127 Katakana

##### Model 2 002

Maximum LPM	Character Set
400	48
300	64
230	94
160	127 Katakana

#### Prerequisites:

**For SDLC Communications with S/370, 4331 or 4341 Processor:** A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or these operating systems running under VM/370.

**For BSC Communications with S/360, S370 or 4300 Processor:** A virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370. The 3776 Communication Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360, S/370 or 4300 Processors using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3776. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370, 4331, 4341 or 4381 Processor; or via an Integrated Communications Adapter on S/370 mdl 115, 125, 135-3 or 138; or via a Communications Adapter feature on the 4331 or 4361 Processor. BSC attachment can be made via a 3704/3705 attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25. Note: The 3725 is not connectable to S/360.

**For BSC Communications with System/38:** All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment

(#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See "IBM System/38 Data Communications Programmer's Guide", SC21-7825, for BSC function and compatibility considerations.

**Limitations:** The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard and printer are standard. For other configurations, refer to "Special Features" below.

#### HIGHLIGHTS

- **Keyboard:** (Canada only) EBCDIC arrangement with 44 data keys (produces 88 characters). (Except Japan Katakana and Canada) use EBCDIC arrangement with 47 data keys (produces 94 characters). (Less) Underscore/Hyphen, Backspace, Space, and Character Advance keys have typamatic operation. Japan Katakana uses 48 keys in EBCDIC arrangement (produces 127 characters). The Japan Katakana keyboard provides typamatic operation for Backspace, Space, Tab, New Line, and Character Advance. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.
- **Printer:** Line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, 94- or 127-character set) -- see "Specify" -- variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3488 for forms design considerations.
- **Buffers:** Transfer data between the input and output devices and the communication line. Buffers also transfer data between input and output devices during offline operation. The buffers alternate in providing input and output service to permit overlapped operation. Dual 256-byte or dual 512-byte buffers are used to BSC or SDLC operation and are under operator control.
- **Printer Format Controls:** Facilitate the formatting or printed data. Vertical and horizontal control characters in data initiate vertical and horizontal tabbing.
- **Compression/Expansion:** Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards or diskette. A 2-byte sequence is substituted for each occurrence or three or more consecutive blanks (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 63 consecutive blanks are read. The terminal monitors received non-transparent data that is destined for the printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks.
- **SDLC implementation provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.**
- **Transmission Reversal:** Permits keyboard initiation of interrupt of host data transmission for terminal data transmission and for resumption of the host transmission upon completion of the terminal transmission. The function is dependent upon associated host programming.
- **Record Compress:** Using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3776 diskette for subsequent batch transmission. The compressed records are written on

the 3776 diskette in 3770 mode. Record Compress using one diskette storage device permits the compression of Basic Exchange diskette records into blocks of 256 bytes of 512 bytes for transmission.

- **Dual Data Path:** Provides for concurrent operation of a line-to-printer job and a card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line and transfer it to the printer. A single 256-byte or single 512-byte buffer is used for data buffering between card I/O and diskette or diskette and diskette. Throughput for both online and off-line jobs is degraded when run concurrently using dual data path.
- **Automatic Card to Line Job:** When an online job is completed and the 3776 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.
- **Input/Output Form Definitions:** Can be operator- or terminal-defined. Up to five operator-defined forms can be read from diskette or card reader to facilitate rapid job setup when the terminal is equipped with either of the special features; otherwise they can be entered from the keyboard. Printer format controls can be part of the job definition. An appropriately configured 3776 will permit input/output job designations as follows:

Input	Output
Offline Jobs	
Diskette(1)	Printer, Diskette or Card Punch
Card Reader(1)	Printer, Diskette or Card Punch

#### Online Batch Jobs

Diskette or Card Reader(1)	Line
Line(1)	Printer, Diskette or Card Punch

#### Dual Data Path Jobs

Line(2)	Printer
Card Reader(2)	Diskette
Diskette(2)	Card Punch
Diskette(2)	Diskette

1. One input device and one output device per job.
2. Line-to-printer occurs concurrently with card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette.

**Performance Considerations:** Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printer, forms skipping, application processing, etc., must all be considered in determining actual throughput. See "IBM 3770 Data Communication System", GA27-3097, for additional information.

**Problem Determination Procedures:** Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See "IBM 3776 Operating Procedures Guide", GA27-3107.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out

the trouble report prior to calling IBM for service. Also refer to M2700 pages.

**Communications:** See "Special Features". Transmission speeds up to 4800 bps over switched or nonswitched facilities are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information. Also refer to M3863, 3684, 3868 and 3872 pages. The 2400 bps Integrated Modem and 3872 Modem when appropriately configured can be intermixed on the same communication facility. (Japan only > NTT and other non-IBM modems can be attached via the CCITT feature. <)

**Bibliography:** GC20-0001

#### SPECIFY

- (Canada only > Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug. <)
- **Power (AC, 1-phase):** One must be specified. Note: Not recommended for field installation.

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811	200V	#2732
200V	#2806	220V	#2803
220V	#2813		
235V	#2814		

- **Power Cords:** One must be specified. Note: Not recommended for field installation.

59 Hz cord without plug (#2760)  
60 Hz cord without plug (#2762)

- **Color Group:** One only must be specified. Available at time of manufacture only. #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray.
- **Language Group:** One must be specified. Note: Not recommended for field installation.

English	#2927
Italian	#2932
French	#2928
German	#2929
Japanese	#2930
Spanish	#2931

- **Keyboard Arrangement:** One must be specified. Note: Not recommended for field installation except for International (#2950) which may be field installed. International (#2950) is required if #2766 - 48-character set EBCDIC (HN Character Set) is specified at time of manufacture. International (#2950) may not be field removed. Also see Print Belt, Add'l, in "Accessories".

Brazilian	#2975	Japanese	#2955
English UK	#2958	Japan Katakana	#2973
Finnish	#2963	Portuguese	#2959
French	#2970	Spanish	#2960
German	#2957	Span Speak	#2969
Int'l	#2950		
Italian	#2968		

- **Print Belt Character Set:** Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine. See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry.

(Canada only > #9489 -- 48-character set EBCDIC (HN Character Set)\*  
#9490 48-character set EBCDIC (Standard Character Set)\*

#9491 64-character EBCDIC  
#9492 94-character set EBCDIC  
#9493 48-character set ASCII\*\*  
#9494 64-character set ASCII\*\*  
#9495 94-character set ASCII\*\*<)

(Except Canada > #2766 -- 48-character set EBCDIC (HN Character Set)\* \*\*\*  
#2767 48-character set EBCDIC (Standard Character Set)\*  
#2768 64-character set EBCDIC<)

#2873 127-character set, Japan Katakana\*\*\*\*

\* These belts are identical except for the special character differences:

HN Character Set has: ) ( =  
Standard Character Set has: % # @

(Canada only > \*\* ASCII Feature (#1201) is required.<)

(Except Canada > \*\*\* International Keyboard Arrangement (#2950) required.<)

\*\*\*\* #2873 requires #2973. The Japan 48- or 64-character Print Belts (see "Accessories") can be used interchangeably with the 127-character Katakana print belt when #2873 is specified.

Print Belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

HN Character Set Specified	Data Stream Char	Printed Char
HN Belt Installed	) ( =	) ( =
HN Belt Installed	% # @	) ( =
Std Belt Installed	) ( =	% # @
Std Belt Installed	% # @	% # @
Std Character Set Specified		
Std Belt Installed	% # @	% # @
Std Belt Installed	) ( =	- - -
HN Belt Installed	% # @	) ( =
HN Belt Installed	) ( =	- - -

- Cabling: Fixed-length cables are supplied as standard. Refer to "Installation Manual - Physical Planning", GA27-3006.
- Remote Power Off (#9501): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.

## MODEL CONVERSIONS

Changes from model 1 to model 2, 3 or 4 and from model 2 to model 4 are field installable. Note: Customer price quotations and customer order acknowledgment letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM".

## SPECIAL FEATURES

(Except Canada > All special features can be field installed.<)

(Canada only > All special features can be field installed, except #1201 for which field installation is not recommended.<)

**For Communication Capability:** Select one Communication Feature (#1460, #1461 or #1470); a Communication Driver (#1481); one Integrated Modem (Canada only > (#5600, #5602, #5610, #5700, #5702, #5710) or EIA <) (#2881, #5600, #5602, #5700, #5702) or CCITT Interface (#3701). X.21 Adapter for Nonswitched Networks (#5655). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

**(Canada only > ASCII Feature (#1201):** A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. Maximum: One Field Installation: Not recommended. Specify: Orders for #1201 must also specify one print belt, #9493 for 48-character ASCII, #9494 for 64-character ASCII, or #9495 for 94-character ASCII.<)

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One.

**SDLC/BSC, Switch Control (#1460):** Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. Limitations: Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One.

**BSC, Point To Point (#1461):** Provides for point-to-point BSC operation over switched or nonswitched facilities. Limitations: Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One.

**BSC Multipoint (#1462):** Required for BSC multipoint operation over nonswitched facilities. Limitations: See GA27-3097 for BSC compatibility considerations. Maximum: One. Prerequisites: #1460 or #1461.

**SDLC (#1470):** Provides for switched or nonswitched SDLC procedures. (Canada only > For record purposes, also identify the primary CPU/Program Environment code. Specify one of the following: #9977 for DOS/VS VTAM, #9988 for OS/VS1 VTAM, #9989 for OS/VS2 VTAM, or #9993 for all other combinations of operating systems and access methods.<) Limitations: Cannot be installed with #1460 or #1461. Maximum: One.

**Communication Driver Without Business Machine Clocking (#1481):** Provides communication driver without clocking. Maximum: One. Prerequisites: #1460, #1461 or #1470. 2400 bps Integrated Modem, Switched, Caducee Network (#2881)

This self-clocked modem provides for point-to-point operation over the Caducee switched network. Operator controls provide for half-speed operation and Talk/Data. Limitations: Cannot be installed with #3701, or with another Integrated Modem. Maximum: One. Prerequisites: #1481.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. Limitations: The keys provided for this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One.

**Door Keylock, Dual (#3402):** Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with these locks can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One. Prerequisites: Diskette Storage, 2nd (#4902).

**(Canada only > EIA Interface (#3701):** Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds up to 4800 bps for switched or nonswitched operation are

permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3902) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. Limitations: Cannot be installed with any Integrated Modem Feature. Maximum: One. Prerequisites: #1481. <)

**(Except Canada > CCITT Interface (#3701):** Provides a CCITT interface and cable for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages. Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds of up to 4800 bps for switched and nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3902) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. Limitations: Cannot be installed with any Integrated Modem feature. <) Not with X.21 Adapter for Nonswitched Networks (#5655). Maximum: One. Prerequisites: #1481.

(Japan Only > Specify: #2946 for NTPC Self-Test for use with DCE that is attached under the provisions of the IBM Multiple Supplier Systems Policy. <)

**Modem Fan-Out (#3901):** Equips the 2400 bps Integrated Modem, Nonswitched, Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. Limitations: This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. Maximum: One. Prerequisites: #5602.

**Modem Fan-Out (#3902):** Equips the 4800 bps Integrated Modem, Nonswitched, Multipoint (#5702) with the capability to be shared by up to two other terminals in addition to the terminal containing the integrated modem. Limitations: This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. Maximum: One. Prerequisites: #5702.

**Forms Stand:** Integrated into the machine covers for the 3776 mdl 1 and 2.

**Front Feed (#3951):** Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. Maximum: One.

**Diskette Storage, 1st (#4901):** Provides one device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records or up to 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive numbered sectors in interchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive sectors in interchange mode, or four non-consecutive sectors in 3770 mode. Diskette data is code insensitive in SDLC mode, non-transparent only in BSC mode. Maximum: One.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. \*The second diskette allows additional capabilities for: Copy - data can be copied from Diskette 1 to Diskette 2 (single data set or all active data sets - 3770 mode only) - Concatenate (pool) - the ability to concatenate on a data set basis - Continue - allows a read or write operation

to automatically continue to Diskette 2 if it has been placed in a Ready condition. Maximum: One. Prerequisites: #4901. Orders for field installation must specify color -- #9081 for red, #9082 for yellow, #9083 for blue, or #9085 for gray. Color must be the same as that specified for the base machine.

**Operator ID Feature (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8" ranging from 0.007" to 0.045" thick may be read. See "NDD-SS Sales Manual" for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. Limitations: The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. BSC programming for 2770 and 3780 does not support this feature. Maximum: One.

**2400 bps Integrated Modem, Nonswitched, Point-To-Point (#5600):** This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. For Japan only: Also specify #2943 for NTT D-1 Service Connection.

**2400 bps Integrated Modem, Nonswitched, Multipoint (#5602):** This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection. <) (Canada only > 2400 bps Integrated Modem Switched, With Auto Answer (#5610)

This self-clocked modem provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Operator controls provide for half-speed operation. Limitations: Cannot be installed with #3701, or with another Integrated Modem. Maximum: One. Prerequisites: #1481. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user. <)

**X.21 Adapter For Nonswitched Networks (#5655):** Provides a cable and interface meeting CCITT X.21 characteristics for attachment of data communication equipment. Feature operates only over nonswitched lines using SDLC procedures. Speeds of 2400 or 4800 bps are permitted. Limitations: 1) Japan DDC nonswitched Network only. 2) Not with #3701. 3) Not with Integrated Modem features. Maximum: One. Prerequisites: #1470, #1481. Specify: (Record purposes only) #9822 for 2400 bps, #9823 for 4800 bps.

**4800 bps Integrated Modem, Nonswitched, Point-To-Point (#5700):** This self-clocked modem provides for point-to-point operation over 4-wire nonswitched communication facilities. This modem features automatic equalization and manual half-speed select. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection. <)

**4800 bps Integrated Modem, Nonswitched, Multipoint (#5702):** This self-clocked modem provides for multipoint operation over 4-wire nonswitched communication facilities. This modem features automatic equalization and manual half-speed select. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection. <)

(Canada only > 4800 bps Integrated Modem, Switched, With Auto Answer (#5710): This self-clocked modem provides for point-to-point operation over switched network facility using manual originate/auto answer for establishing connection. This modem features automatic equalization and manual half-speed select. Limitations: Cannot be installed with #3701, or with another Integrated Modem. Maximum: One. Prerequisites: #1481. <) (Canada only > Note: Attachment to the switched telephone network is via

common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user. < )

**(Canada only > Switched Network Backup (#7951):** Provides the capability of attaching 2400 bps Integrated Modem (#5600 or #5602) to the switched network facility as a backup to the primary non-switched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 2400/1200 bps with an IBM 3872 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. Note: To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required at the using system. This feature can be used with BTAM programs for DOS/VS, OS/VS1 and OS/VS2 in certain configurations. Additional customer program routines will be required in existing BTAM programming to fully utilize the capabilities of this feature. Limitations: Cannot be installed with #3701. Maximum: One. Prerequisites: 2400 bps Integrated Modem (#5600 or #5602). < ) (Canada only > Note: Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user. < )

**(Canada only > Switched Network Backup (#7952):** Provides the capability of attaching 4800 bps Integrated Modem (#5700 or 5702) to the switched network facility as a backup to the primary non-switched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 4800/2400 bps with an IBM 3874 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. Note: To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required on the using system. Additional customer program routines will be required in existing programming to fully utilize the capabilities of this feature. Limitations: Cannot be installed with #3701. Maximum: One. Prerequisites: #5700 or #5702. < ) (Canada only > Note: Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user. < )

**3501 Card Reader Attachment (#8050):** To attach a 3501 Card Reader. Limitations: Cannot be installed with #8149. If a 3521 is also attached (#8150), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

**3782/2502 Card Reader Attachment(#8149):** To attach a 3782 Card Attachment Unit mdl 2 and a 2502 Card Reader mdl A1 or A2. Limitations: Cannot be installed with #8050. If a 3521 is also attached via #8150, the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check, Card Print or Card Print Katakana. Limitations: If a 2502 or 3501 Card Reader is also attached (#8149 or 8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

## ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

**Print Belt:** A metal belt with engraved font. Available in EBCDIC character arrangement for the countries listed in the table below. Character set sizes of 64 or 94 (96 positions of which 94 are printable) are available. See "Specify" for restrictions or limitations. The belt can be interchangeably used with the one provided on the machine. Order must contain two feature numbers, one from Table A and one from Table B.

Table A - Character Set Size

#2796	48-character set (HN Character Set)*
#2797	48-character set (Standard Set)
#2798	64-character set
#2799	94-character set
#5831	96-character Courier (WP-EBCDIC)
#5832	96-character Artisan (WP-EBCDIC)
#5833	128 character DP and WP) (EBCDIC)

Table B - Country Arrangement

#2975	Brazil**	#2968	Italy
#2977	Canada(Fr.)**	#2955	Japan(Eng.)**
#2956	English US	#2973	Japan(Kata.)
#2958	English UK	#2960	Spain
#2970	France	#2969	Span. Speak**
#2957	Germany	#2953	Text Print
#2950	Int'l * **		EBCDIC(English
			US only)

\* Country Arrangement International (#2950) must be used with 48-Character set (#2796) (HN Character Set).

\*\* Not available with #5831, #5832 or #5833.

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order.

**Mercury Battery (P/N 1743456):** Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. Note: Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136670 (No Longer Available) , or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

## 3776 COMMUNICATION TERMINAL MODELS 3, 4

### PURPOSE

The 3776 is a medium speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776-3 and 3776-4 are SNA Multiple Logical Unit (MLU) terminals. A keyboard and a console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal set-ups and local utility programs in terminal storage for use by the terminal operator. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, 94-, or 127-character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm.

### MODELS 3, 4

#### Model 3 003

Maximum LPM	Character Set
300	48
230	64
160	94
80	127 Katakana

#### Model 4 004

Maximum LPM	Character Set
400	48
300	64
230	94
160	127 Katakana

**Limitations:** The input/output capabilities outlined under "High-lights" are dependent on appropriate configurations of the terminal. Keyboard, console display, terminal storage and printer are standard. One communications feature (#3701, #4501, #5605 or #5651) is required. For other configurations, refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full-duplex communications facilities only.

**Prerequisites for SDLC Communications with S/370 or 4300 Processor:** A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370, 4331 or 4341 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS or VTAM. An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

### HIGHLIGHTS

- Keyboard: EBCDIC arrangement with (Canada only >44<) (Except Canada >47<) data keys for all countries except Japan (Katakana). Japan Katakana uses 48 data keys. The keyboard, in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display, provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are

non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

- Console Display: Contains 16 lines of 64 characters each for a total of 1024 characters. The 3776-3 and 3776-4 reserve the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input. Lower case alphabets are converted to upper case before displaying. Katakana machines provide for upper case Katakana characters only. When the cursor is beneath a character, any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted. Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time, the operator is prompted to specify date and time. As messages are received, they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state, a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

- Printer: Line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, 94- or 127-character set) -- see "Specify". Also standard are a variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3844 for forms design considerations.
- Forms Stand: Is integrated into the machine covers for the 3776 mdl 3 and 4.
- Terminal Storage: Is standard for message spooling, terminal control, utility programs and user-generated procedures.
- Diskette Storage: There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3776-1 and 3776-2, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.
- Magnetic Tape: May be used as either an input or as an output device. One 3411-1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411-1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-track tape operation is not provided. The 3411-1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4000 bytes. Maximum record size is 255 bytes. A block size of up to 2000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal

functions. Refer to G232-0004 for detailed information on operation of the 3411-1. Refer to M3411 for ordering information. Feature #7003 is required on the 3411 mdl 1.

- **Buffers:** Transfer data between the input and output devices and the communication line. SDLC communications uses a customer-defined Request/Response Unit (RU) of 256 or 512 byte buffer. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. Buffers also transfer data between input and output devices during local operation.
- **Printer Format Controls:** Facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.
- **Compression/Expansion:** Implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.
- **Decompression:** Provides the decompression function associated with the receipt of a compacted data stream whereby a pair of consecutive alphanumeric characters is represented by a single transmission byte. Function depends upon transmission by the host of a decompression table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompression occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided.
- **Automatic Card Reading:** Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.
- **Job Control:** Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printer, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printer, Diskette, Card Punch
Diskette	Printer, Magnetic Tape, Diskette, Card Punch

- **Record Formats:** Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic Exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 120 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

- **Remote Power Off:** See #9501 under "Specify" below.
- **Encrypt/Decrypt Feature:** Available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature (Program Number 5735-RC2) (Feature Number 6010) and Programmed Cryptographic Facility Program Product (Program Number 5740-XY5).

**Performance Considerations:** The line-to-printer performance of the 3776-3 is up to 300 lpm with a 48-character set print belt. The line-to-printer performance of the 3776-4 is up to 400 lpm with a 48-character set print belt.

The 3776-3 and 3776-4 MLU terminals will operate, however, with concurrent input-output processing in either a Duplex or Half Duplex data communications mode as a function of the base Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations. The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and system facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, cryptographic processing, etc., must all be considered in determining actual throughput.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3776-3 or 3776-4 operating Duplex at (Canada only > 19.2K bps <) (Except Canada > 20.4K bps <) on a terrestrial link may, however, present a variance of from greater to degrade overall terminal throughput when compared to comparable operation in a half-duplex mode.

**Problem Determination Procedures:** Function has been designed into this unit to help provide availability to the customer. See "IBM 3770 Multiple Logical Unit Operator's Guide for 3776-3, 3776-4, 3777-3", GA27-3125.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

**Communications:** See "Special Features" -- Transmission speeds from 2400 bps to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above (Canada only > 4800 <) (Except Canada > 9600 <) bps are on nonswitched facilities. Direct local attachment to 3705-II at 1.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. (Canada only > ASCII is available as a special feature. <) Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

Modem	Speed (bps)	Lines
3833 mdl 1	2400	Nonswitched voice grade
3834 mdl 1	4800	Nonswitched voice grade
3863 mdl 1/2	2400/1200	Nonsw or Sw voice grade
3864 mdl 1/2	4800/2400	Nonsw or Sw voice grade
3865 mdl 1/2	9600/4800	Nonswitched voice grade
3868 mdl 1	2400/1200	Nonswitched voice grade
3868 mdl 2	4800/2400	Nonswitched voice grade
3868 mdl 3/4	9600/4800	Nonswitched voice grade
5811 mdl 10	2400 to 9600	Limited Distance Modem
5811 mdl 18		Rack mount version of mdl 10
5811 mdl 20	2400 to 9600	Nonswitched baseband
5811 mdl 28		Rack mount version of mdl 20
5812 mdl 10	2400 to 9600	Nonswitched baseband
5812 mdl 18		Rack mount version of mdl 10
5865 mdl 2/3	9600/7200 4800	Nonswitched voice grade
5868 mdl 52		Rack mount version of 5865 mdl 2
5866 mdl 2/3	14400/9600	Nonswitched voice grade
5868 mdl 62		Rack mount version of 5866 mdl 1/2

**Note:** 4-wire Switched Network Backup is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire Switched Network Backup is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**Communications Adapter without Business Machine Clocking:** Standard -- integrated to provide SDLC communications over switched or nonswitched facilities.

**Bibliography:** GC20-0001

## SPECIFY

- (Canada only) > Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug. See M3411 for Magnetic Tape Unit power requirements. <)
- Power (AC, 1-phase): One must be specified.

50 Hz	60 Hz
100V #2804	100V (#2730)
110V #2805	115V (#9901)
123.5V #2811	200V (#2732)
200V #2806	220V (#2803)
220V #2813	
235V #2814	

See M3411 for Magnetic Tape Unit power requirements.

- Power Cords: One must be specified.  
50 Hz cord without plug (#2760)  
60 Hz cord without plug (#2762)
- Color Group: Blue is supplied as standard except for field model conversions where installed color groups will be matched (do not specify).
- Language Group: One must be specified. Note: Not recommended for field installation.  
English #2927 Italian #2932  
French #2928 Japanese #2930  
German #2929 Spanish #2931
- Keyboard Arrangement: One must be specified. Note: Not recommended for field installation except for International (#2950) which may be field installed. International (#2950) is required if #2766 - 48-character set EBCDIC (HN Character Set) is specified at time of manufacture. International (#2950) may not be field removed. Also see "Print Belt, Add'l" in "Accessories".  
Brazilian #2975 Japanese #2955  
English UK #2958 Japanese #2955  
French #2970 Katakana #2973  
German #2957 Portuguese #2959  
Int'l #2950 Spanish #2960  
Italian #2968 Span Speak #2969
- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine). See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry.

(Canada only >

#9489 48-character set EBCDIC (HN Character Set)\*  
#9490 48-character set EBCDIC (Standard Character Set)\*  
#9491 64-character EBCDIC  
#9492 94-character set EBCDIC  
#9493 48-character set ASCII\*\*  
#9494 64-character set ASCII\*\*  
#9495 94-character set ASCII\*\*

- These belts are identical except for the special character differences:

HN Character Set has: ) ( =  
Standard Character Set has: % # @

- ASCII Feature (#1201) is required. <)

(Except Canada >

#2766 48-character set EBCDIC (HN Character Set)\* \*\*  
#2767 48-character set EBCDIC (Standard Character Set)\*  
#2768 64-character set EBCDIC  
#2769 94-character set EBCDIC <)  
#2873 127-character set, Japan Katakana\*\*\*

- (Except Canada > \* These belts are identical except for the special character differences:

HN Character Set has: ) ( =  
Standard Character Set has: % # @

- International Keyboard Arrangement (#2950) required. <)

\*\*\* #2873 requires #2973. The Japan 48- or 64-character Print Belts (see "Accessories") can be used interchangeably with the 127-character Katakana print belt when #2873 is specified.

Print belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

Data  
Stream Printed

Char Char

### HN Character Set Specified

HN Belt Installed	) ( =	) ( =
HN Belt Installed	% # @	) ( =
Std Belt Installed	) ( =	% # @
Std Belt Installed	% # @	% # @

### Std Character Set Specified

Std Belt Installed	% # @	% # @
Std Belt Installed	) ( =	- - -
HN Belt Installed	% # @	) ( =
HN Belt Installed	) ( =	- - -

- Cabling: Fixed-length cables except for 3411 Magnetic Tape and Control are supplied as standard. Refer to "Installation Manual - Physical Planning", GA27-3006. 3411 cables must be separately ordered.
- Remote Power Off (#9501): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.
- (Canada only>EIA RS-232C 19.2K bps Line Speed: #9481 -- provides support of 19.2K bps. <)
- (Canada only>Alternate Address (#9011): (For record purposes only) Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by<) (Canada only>CE<) (Canada only>using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location.<)

### SPECIAL FEATURES

All special features can be field installed. (Canada only>Field installation is not recommended for feature #1201.<)

**(Canada only>ASCII Feature (#1201):** A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). Maximum: One. Field Installation: Not recommended. Specify: Orders for #1201 must also specify one print belt, #9493 for 48-character ASCII, #9494 for 64-character ASCII, or #9495 for 94-character ASCII.<)

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One.

**CCITT-V35 Interface (#2911):** Provides a cable and interface compatible with CCITT-V35 recommendations for attachment of data communication equipment (see M2700 pages). Speed of (Canada only>19.2K bps<) (Except Canada>20.4K bps<) is permitted.

(Canada only>See the IBM Canada Data Communications Handbook for information.<) Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with a maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150.0m (491 ft). Limitations: Cannot be installed with #3701, #4501 or #5655. Maximum: One.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. Limitations: The keys provided for this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One.

**Door Keylock, Dual (#3402):** Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with these locks can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One. Prerequisites: #4902.

**Encrypt/Decrypt (#3680):** Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. Maximum: One. Prerequisites: A mercury battery, IBM P/N 1743456 or equivalent is required. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

**(Canada only>EIA Interface (#3701):** Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. Limitations: Cannot be installed with DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651), High-Speed Digital Interface (#4501), or V35 Interface (#4720). Maximum: One. Prerequisites: For 19.2K bps operation, #9481 is required -- see "Specify".<)

**(Except Canada>CCITT-V24/28 Interface (#3701):** Provides a cable and interface compatible with CCITT-V24/28 recommendations for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations (refer to M2700 Pages). Other external non-IBM modems may be attached subject to the Multiple System Supplier Bulletin. Speeds from 2400 bps to 9600 bps are permitted.

Limitations: Cannot be installed with<) (Except Canada>#4501 or #2911.<) #4501, #2911 or #5655. (Except Canada>Maximum: One.<) (Japan only>Specify: #2946 for NTPC Self-Test for use with DCE that is attached under the provisions of the IBM Multiple Supplier Systems Policy.<)

**Front Feed (#3951):** Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

**High-Speed Digital Interface (#4501):** Provides a cable and interface for attachment to a modem which permits point-to-point and multipoint synchronous operation at (Canada only>19.2K<) (Except Canada>20.4K<) bps on a broadband channel. Limitations: Cannot be installed with #3701, #2911, or #5655. Maximum: One.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. Maximum: One.

**Diskette Storage, 1st (#4901):** Provides one device with a customer removable diskette placed in the left desk cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format data set. Diskette capabilities allow for: Concatenate (pool) - the ability to concatenate on a data set basis -- Multivolume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive. Maximum: One.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Copy - data can be copied from Diskette 1 to Diskette 2. Maximum: One. Prerequisites: #4901.

**Operator ID Feature (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus

odd parity. Card size 3-3/8" x 2-1/8" ranging from 0.007" to 0.045" thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. Limitations: The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. Maximum: One.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides a cable and interface meeting CCITT X.21 characteristics for attachment of data communication equipment. Feature operates only over non-switched lines using SDLC procedures. Speeds of 2400, 4800 or 9600 bps are permitted. Limitations: 1) Japan DDC nonswitched Network only, 2) Not with #3701, #2911 or #4501. Maximum: One. Specify: (Record purposes only) #9822 for 2400 bps, #9823 for 4800 bps, or #9825 for 9600 bps.

**3411 Magnetic Tape Unit And Control Mdl 1 Attachment (#7801):** To attach one 3411 Magnetic Tape Unit and Control mdl 1. Maximum: One. Prerequisites: #7003 on the 3411-1.

**3782/2502 Card Reader Attachment (#8149):** To attach a 3782 Card Attachment Unit Mdl 2 and a 2502 Card Reader Mdl A1, A2, or A3. Limitations: OMR is not supported. Maximum: One.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. Limitations: The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

## MODEL CONVERSIONS

Changes from model 3 to model 4 are field installable.

**Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

## ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

**Print Belt:** A metal belt with engraved font. Available in EBCDIC character arrangement for the countries listed in the table below. Character set sizes of 64 or 94 (96 positions of which 94 are printable) are available. See "Specify" for restrictions or limitations. The belt can be interchangeably used with the one provided on the machine.

Order must contain two feature numbers, one from Table A and one from Table B.

Table A - Character Set Size

#2796	48-character set (HN Character Set)*
#2797	48-character set (Standard Set)
#2798	64-character set
#2799	94-character set
#5831	96-character Courier (WP-EBCDIC)
#5832	96-character Artisan (WP-EBCDIC)
#5833	128-character DP and WP (EBCDIC)

Table B - Country Arrangement

#2975	Brazil**	#2968	Italy
#2977	Canada Fr.**	#2955	Japan Eng.**
#2956	English US	#2973	Japan Katakana
#2958	English UK	#2960	Spain
#2970	France	#2969	Span Speak**
#2957	Germany	#2953	Text Print -
#2950	Int'l* **		EBCDIC-English
			US only

\* Country Arrangement International (#2950) must be used with 48-Character set (#2796) (HN Character Set).

\*\* Not available with #5831, #5832 or #5833.

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order.

**Mercury Battery (P/N 1743456):** Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. Note: Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136670 (No Longer Available), or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

## 3776 COMMUNICATION TERMINAL MODELS 1, 2

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 3776 is a medium-speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776 mdls 1 and 2 are SNA Single Logical Unit (SLU) and BSC terminals. A keyboard is used for terminal control and for operator communication with the host processor. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, 94 or 127-character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 50, 150 or 300 cards per minute. The card punch operates at 50 cpm.

Communication features permit operation over switched or non-switched facilities at speeds up to 4800 bps using SDLC or BSC transmission techniques and an appropriate modem.

### MODELS 1, 2

#### Model 1 001

Maximum LPM	Character Set
300	48
230	64
160	94
80	127 Katakana

#### Model 2 002

Maximum LPM	Character Set
400	48
300	64
230	94
160	127 Katakana

#### Prerequisites:

**For SDLC Communications with S/370, 4331 or 4341 Processor:** A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under DQS/VS, OS/VS1 or OS/VS2; or these operating systems running under VM/370.

**For BSC Communications with S/360, S370 or 4300 Processor:** A virtual storage S/370 or 4300 Processor operating under DOS/VS, OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370. The 3776 Communication Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360, S/370 or 4300 Processors using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3776. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370, 4331, 4341 or 4381 Processor; or via an Integrated Communications Adapter on S/370 mdl 115, 125, 135-3 or 138; or via a Communications Adapter feature on the 4331 or 4361 Processor. BSC attachment can be made via a 3704/3705 attached to a channel of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25. Note: The 3725 is not connectable to S/360.

**For BSC Communications with System/38:** All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment

(#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See "IBM System/38 Data Communications Programmer's Guide", SC21-7825, for BSC function and compatibility considerations.

**Limitations:** The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard and printer are standard. For other configurations, refer to "Special Features" below.

### HIGHLIGHTS

- **Keyboard:** (Canada only) EBCDIC arrangement with 44 data keys (produces 88 characters). (.) (Except Japan Katakana and Canada) use EBCDIC arrangement with 47 data keys (produces 94 characters). (<) Underscore/Hyphen, Backspace, Space, and Character Advance keys have typamatic operation. Japan Katakana uses 48 keys in EBCDIC arrangement (produces 127 characters). The Japan Katakana keyboard provides typamatic operation for Backspace, Space, Tab, New Line, and Character Advance. Associated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display.
- **Printer:** Line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, 94- or 127-character set) -- see "Specify" -- variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3488 for forms design considerations.
- **Buffers:** Transfer data between the input and output devices and the communication line. Buffers also transfer data between input and output devices during offline operation. The buffers alternate in providing input and output service to permit overlapped operation. Dual 256-byte or dual 512-byte buffers are used to BSC or SDLC operation and are under operator control.
- **Printer Format Controls:** Facilitate the formatting or printed data. Vertical and horizontal control characters in data initiate vertical and horizontal tabbing.
- **Compression/Expansion:** Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from cards or diskette. A 2-byte sequence is substituted for each occurrence or three or more consecutive blanks (63 consecutive blanks is the upper limit). A second 2-byte sequence is appended if more than 63 consecutive blanks are read. The terminal monitors received non-transparent data that is destined for the printer or attached card punch and automatically expands this 2-byte sequence to the correct number of blanks.
- **SDLC implementation** provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.
- **Transmission Reversal:** Permits keyboard initiation of interrupt of host data transmission for terminal data transmission and for resumption of the host transmission upon completion of the terminal transmission. The function is dependent upon associated host programming.
- **Record Compress:** Using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3776 diskette for subsequent batch transmission. The compressed records are written on

the 3776 diskette in 3770 mode. Record Compress using one diskette storage device permits the compression of Basic Exchange diskette records into blocks of 256 bytes of 512 bytes for transmission.

- **Dual Data Path:** Provides for concurrent operation of a line-to-printer job and a card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line and transfer it to the printer. A single 256-byte or single 512-byte buffer is used for data buffering between card I/O and diskette or diskette and diskette. Throughput for both online and off-line jobs is degraded when run concurrently using dual data path.
- **Automatic Card to Line Job:** When an online job is completed and the 3776 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.
- **Input/Output Form Definitions:** Can be operator- or terminal-defined. Up to five operator-defined forms can be read from diskette or card reader to facilitate rapid job setup when the terminal is equipped with either of the special features; otherwise they can be entered from the keyboard. Printer format controls can be part of the job definition. An appropriately configured 3776 will permit input/output job designations as follows:

Input	Output
Offline Jobs	
Diskette(1)	Printer, Diskette or Card Punch
Card Reader(1)	Printer, Diskette or Card Punch

### Online Batch Jobs

Diskette or Card Reader(1)	Line
Line(1)	Printer, Diskette or Card Punch

### Dual Data Path Jobs

Line(2)	Printer
Card Reader(2)	Diskette
Diskette(2)	Card Punch
Diskette(2)	Diskette

1. One input device and one output device per job.
2. Line-to-printer occurs concurrently with card reader-to-diskette, or diskette-to-card punch, or diskette-to-diskette.

**Performance Considerations:** Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printer, forms skipping, application processing, etc., must all be considered in determining actual throughput. See "IBM 3770 Data Communication System", GA27-3097, for additional information.

**Problem Determination Procedures:** Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See "IBM 3776 Operating Procedures Guide", GA27-3107.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out

the trouble report prior to calling IBM for service. Also refer to M2700 pages.

**Communications:** See "Special Features". Transmission speeds up to 4800 bps over switched or nonswitched facilities are allowed by selecting the appropriate modem and communication facility. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information. Also refer to M3863, 3684, 3868 and 3872 pages. The 2400 bps Integrated Modem and 3872 Modem when appropriately configured can be intermixed on the same communication facility. (Japan only>NTT and other non-IBM modems can be attached via the CCITT feature.<)

**Bibliography:** GC20-0001

## SPECIFY

- (Canada only> Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug.<)
- Power (AC, 1-phase): One must be specified. Note: Not recommended for field installation.

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811	200V	#2732
200V	#2806	220V	#2803
220V	#2813		
235V	#2814		

- Power Cords: One must be specified. Note: Not recommended for field installation.

59 Hz cord without plug (#2760)  
60 Hz cord without plug (#2762)

- Color Group: One only must be specified. Available at time of manufacture only. #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray.
- Language Group: One must be specified. Note: Not recommended for field installation.

English	#2927
Italian	#2932
French	#2928
German	#2929
Japanese	#2930
Spanish	#2931

- Keyboard Arrangement: One must be specified. Note: Not recommended for field installation except for International (#2950) which may be field installed. International (#2950) is required if #2766 - 48-character set EBCDIC (HN Character Set) is specified at time of manufacture. International (#2950) may not be field removed. Also see Print Belt, Add'l, in "Accessories".

Brazilian	#2975	Japanese	#2955
English UK	#2958	Japan Katakana	#2973
Finnish	#2963	Portuguese	#2959
French	#2970	Spanish	#2960
German	#2957	Span Speak	#2969
Int'l	#2950		
Italian	#2968		

- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine. See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry.

(Canada only> #9489 -- 48-character set EBCDIC (HN Character Set)\*  
#9490 48-character set EBCDIC (Standard Character Set)\*

#9491 64-character EBCDIC  
#9492 94-character set EBCDIC  
#9493 48-character set ASCII\*\*  
#9494 64-character set ASCII\*\*  
#9495 94-character set ASCII\*\*(<)

(Except Canada > #2766 -- 48-character set EBCDIC (HN Character Set)\* \*\*\*  
#2767 48-character set EBCDIC (Standard Character Set)\*  
#2768 64-character set EBCDIC (<)

#2873 127-character set, Japan Katakana\*\*\*\*

\* These belts are identical except for the special character differences:

HN Character Set has: ) ( =  
Standard Character Set has: % # @

(Canada only > \*\* ASCII Feature (#1201) is required. (<)

(Except Canada > \*\*\* International Keyboard Arrangement (#2950) required. (<)

\*\*\*\* #2873 requires #2973. The Japan 48- or 64-character Print Belts (see "Accessories") can be used interchangeably with the 127-character Katakana print belt when #2873 is specified.

Print Belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

HN Character Set Specified	Data Stream Char	Printed Char
HN Belt Installed	) ( =	) ( =
HN Belt Installed	% # @	) ( =
Std Belt Installed	) ( =	% # @
Std Belt Installed	% # @	% # @
Std Character Set Specified		
Std Belt Installed	% # @	% # @
Std Belt Installed	) ( =	- - -
HN Belt Installed	% # @	) ( =
HN Belt Installed	) ( =	- - -

- Cabling: Fixed-length cables are supplied as standard. Refer to "Installation Manual - Physical Planning", GA27-3006.
- Remote Power Off (#9501): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.

## MODEL CONVERSIONS

Changes from model 1 to model 2, 3 or 4 and from model 2 to model 4 are field installable. Note: Customer price quotations and customer order acknowledgment letters for purchase MESS must state: "Installation of this model change involves removal of parts which become the property of IBM".

## SPECIAL FEATURES

(Except Canada > All special features can be field installed. (<)

(Canada only > All special features can be field installed, except #1201 for which field installation is not recommended. (<)

**For Communication Capability:** Select one Communication Feature (#1460, #1461 or #1470); a Communication Driver (#1481); one Integrated Modem (Canada only > (#5600, #5602, #5610, #5700, #5702, #5710) or EIA (<)) (#2881, #5600, #5602, #5700, #5702) or CCITT Interface (#3701). X.21 Adapter for Nonswitched Networks (#5655). #1462 is required in addition to #1460 or #1461 for multipoint operation using BSC.

**(Canada only > ASCII Feature (#1201):** A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. Maximum: One Field Installation: Not recommended. Specify: Orders for #1201 must also specify one print belt, #9493 for 48-character ASCII, #9494 for 64-character ASCII, or #9495 for 94-character ASCII. (<)

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One.

**SDLC/BSC, Switch Control (#1460):** Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with #1462. Limitations: Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One.

**BSC, Point To Point (#1461):** Provides for point-to-point BSC operation over switched or nonswitched facilities. Limitations: Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One.

**BSC Multipoint (#1462):** Required for BSC multipoint operation over nonswitched facilities. Limitations: See GA27-3097 for BSC compatibility considerations. Maximum: One. Prerequisites: #1460 or #1461.

**SDLC (#1470):** Provides for switched or nonswitched SDLC procedures. (Canada only > For record purposes, also identify the primary CPU/Program Environment code. Specify one of the following: #9977 for DOS/VS VTAM, #9988 for OS/VS1 VTAM, #9989 for OS/VS2 VTAM, or #9993 for all other combinations of operating systems and access methods. (<)) Limitations: Cannot be installed with #1460 or #1461. Maximum: One.

**Communication Driver Without Business Machine Clocking (#1481):** Provides communication driver without clocking. Maximum: One. Prerequisites: #1460, #1461 or #1470. 2400 bps Integrated Modem, Switched, Caducee Network (#2881)

This self-clocked modem provides for point-to-point operation over the Caducee switched network. Operator controls provide for half-speed operation and Talk/Data. Limitations: Cannot be installed with #3701, or with another Integrated Modem. Maximum: One. Prerequisites: #1481.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. Limitations: The keys provided for this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One.

**Door Keylock, Dual (#3402):** Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with these locks can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One. Prerequisites: Diskette Storage, 2nd (#4902).

**(Canada only > EIA Interface (#3701):** Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds up to 4800 bps for switched or nonswitched operation are

permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3902) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. Limitations: Cannot be installed with any Integrated Modem Feature. Maximum: One. Prerequisites: #1481.< )

**(Except Canada > CCITT Interface (#3701):** Provides a CCITT interface and cable for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO standard 2110 and other relevant CCITT Recommendations, refer to M2700 pages. Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds of up to 4800 bps for switched and nonswitched operation are permitted. This feature in combination with #1481 can be used to attach to Modem Fan-Out (#3902) on an adjacent terminal, or on an IBM 3863, 3864, 3872 or 3874 Modem. Limitations: Cannot be installed with any Integrated Modem feature.< ) Not with X.21 Adapter for Nonswitched Networks (#5655). Maximum: One. Prerequisites: #1481.

(Japan Only > Specify: #2946 for NTPC Self-Test for use with DCE that is attached under the provisions of the IBM Multiple Supplier Systems Policy.< )

**Modem Fan-Out (#3901):** Equips the 2400 bps Integrated Modem, Nonswitched, Multipoint (#5602) with the capability to be shared by up to two other terminals in addition to the host. Limitations: This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. Maximum: One. Prerequisites: #5602.

**Modem Fan-Out (#3902):** Equips the 4800 bps Integrated Modem, Nonswitched, Multipoint (#5702) with the capability to be shared by up to two other terminals in addition to the terminal containing the integrated modem. Limitations: This feature can be used at a tributary station in a centralized multipoint network. In this configuration, BSC multipoint programming discipline or SDLC nonswitched programming discipline will provide the selection/control of the terminal without any additional user involvement. Maximum: One. Prerequisites: #5702.

**Forms Stand:** Integrated into the machine covers for the 3776 mdl 1 and 2.

**Front Feed (#3951):** Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. Maximum: One.

**Diskette Storage, 1st (#4901):** Provides one device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records or up to 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive numbered sectors in interchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive sectors in interchange mode, or four non-consecutive sectors in 3770 mode. Diskette data is code insensitive in SDLC mode, non-transparent only in BSC mode. Maximum: One.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. \*The second diskette allows additional capabilities for: Copy - data can be copied from Diskette 1 to Diskette 2 (single data set or all active data sets - 3770 mode only) - Concatenate (pool) - the ability to concatenate on a data set basis - Continue - allows a read or write oper-

ation to automatically continue to Diskette 2 if it has been placed in a Ready condition. Maximum: One. Prerequisites: #4901. Orders for field installation must specify color - #9081 for red, #9082 for yellow, #9083 for blue, or #9085 for gray. Color must be the same as that specified for the base machine.

**Operator ID Feature (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8" ranging from 0.007" to 0.045" thick may be read. See "NDD-SS Sales Manual" for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic stripe card cannot be printed. Limitations: The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. BSC programming for 2770 and 3780 does not support this feature. Maximum: One.

**2400 bps Integrated Modem, Nonswitched, Point-To-Point (#5600):** This self-clocked modem provides for point-to-point operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting receive equalization. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. For Japan only: Also specify #2943 for NTT D-1 Service Connection.

**2400 bps Integrated Modem, Nonswitched, Multipoint (#5602):** This self-clocked modem provides for multipoint operation over nonswitched communication facilities. Operator controls provide for half-speed operation and for adjusting transmit and receive equalization. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection.< ) (Canada only > 2400 bps Integrated Modem Switched, With Auto Answer (#5610)

This self-clocked modem provides for point-to-point operation over switched network facilities using manual originate/auto answer for establishing connection. Operator controls provide for half-speed operation. Limitations: Cannot be installed with #3701, or with another Integrated Modem. Maximum: One. Prerequisites: #1481. Attachment to the Switched Network is via FCC registered protective circuitry of the CBS type (or equivalent) provided by the user.< )

**X.21 Adapter For Nonswitched Networks (#5655):** Provides a cable and interface meeting CCITT X.21 characteristics for attachment of data communication equipment. Feature operates only over nonswitched lines using SDLC procedures. Speeds of 2400 or 4800 bps are permitted. Limitations: 1) Japan DDC nonswitched Network only. 2) Not with #3701. 3) Not with Integrated Modem features. Maximum: One. Prerequisites: #1470, #1481. Specify: (Record purposes only) #9822 for 2400 bps, #9823 for 4800 bps.

**4800 bps Integrated Modem, Nonswitched, Point-To-Point (#5700):** This self-clocked modem provides for point-to-point operation over 4-wire nonswitched communication facilities. This modem features automatic equalization and manual half-speed select. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection.< )

**4800 bps Integrated Modem, Nonswitched, Multipoint (#5702):** This self-clocked modem provides for multipoint operation over 4-wire nonswitched communication facilities. This modem feature automatic equalization and manual half-speed select. Limitations: Cannot be installed with #3701, #5655 or with another Integrated Modem. Maximum: One. Prerequisites: #1481. (Japan only > Also specify #2943 for NTT D-1 Service Connection.< )

(Canada only > 4800 bps Integrated Modem, Switched, With Auto Answer (#5710): This self-clocked modem provides for point-to-point operation over switched network facility using manual originate/auto answer for establishing connection. This modem features automatic equalization and manual half-speed select. Limitations: Cannot be installed with #3701, or with another Integrated Modem. Maximum: One. Prerequisites: #1481.< ) (Canada only > Note: Attachment to the switched telephone network is via

common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user. <)

**(Canada only > Switched Network Backup (#7951):** Provides the capability of attaching 2400 bps Integrated Modem (#5600 or #5602) to the switched network facility as a backup to the primary non-switched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 2400/1200 bps with an IBM 3872 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. Note: To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required at the using system. This feature can be used with BTAM programs for DOS/VS, OS/VS1 and OS/VS2 in certain configurations. Additional customer program routines will be required in existing BTAM programming to fully utilize the capabilities of this feature. Limitations: Cannot be installed with #3701. Maximum: One. Prerequisites: 2400 bps Integrated Modem (#5600 or #5602). <) (Canada only > Note: Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user. <)

**(Canada only > Switched Network Backup (#7952):** Provides the capability of attaching 4800 bps Integrated Modem (#5700 or 5702) to the switched network facility as a backup to the primary non-switched facility. Operation over the switched network is in manual originate/manual answer mode to establish the connection. It can communicate at 4800/2400 bps with an IBM 3874 Modem equipped for operation over the public switched network (#7941, #7951 or #7952) attached to a 3704, 3705 or ICA of a 3115 or 3125. Note: To use this feature, operator intervention at the terminal is required. Operator intervention, program modification, or both, may be required on the using system. Additional customer program routines will be required in existing programming to fully utilize the capabilities of this feature. Limitations: Cannot be installed with #3701. Maximum: One. Prerequisites: #5700 or #5702. <) (Canada only > Note: Attachment to the switched telephone network is via common carrier-provided data connector equipment type 1001A (CBS) or equivalent provided by the user. <)

**3501 Card Reader Attachment (#8050):** To attach a 3501 Card Reader. Limitations: Cannot be installed with #8149. If a 3521 is also attached (#8150), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

**3782/2502 Card Reader Attachment (#8149):** To attach a 3782 Card Attachment Unit mdl 2 and a 2502 Card Reader mdl A1 or A2. Limitations: Cannot be installed with #8050. If a 3521 is also attached via #8150, the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check, Card Print or Card Print Katakana. Limitations: If a 2502 or 3501 Card Reader is also attached (#8149 or 8050), the Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

## ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

**Print Belt:** A metal belt with engraved font. Available in EBCDIC character arrangement for the countries listed in the table below. Character set sizes of 64 or 94 (96 positions of which 94 are printable) are available. See "Specify" for restrictions or limitations. The belt can be interchangeably used with the one provided on the machine. Order must contain two feature numbers, one from Table A and one from Table B.

Table A - Character Set Size

#2796	48-character set (HN Character Set)*
#2797	48-character set (Standard Set)
#2798	64-character set
#2799	94-character set
#5831	96-character Courier (WP-EBCDIC)
#5832	96-character Artisan (WP-EBCDIC)
#5833	128 character DP and WP) (EBCDIC)

Table B - Country Arrangement

#2975	Brazil**	#2968	Italy
#2977	Canada(Fr.)**	#2955	Japan(Eng.)**
#2956	English US	#2973	Japan(Kata.)
#2958	English UK	#2960	Spain
#2970	France	#2969	Span. Speak**
#2957	Germany	#2953	Text Print
#2950	Int'l * **		EBCDIC(English
			US only)

\* Country Arrangement International (#2950) must be used with 48-Character set (#2796) (HN Character Set).

\*\* Not available with #5831, #5832 or #5833.

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order.

**Mercury Battery (P/N 1743456):** Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. Note: Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136670, or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

## 3776 COMMUNICATION TERMINAL MODELS 3, 4

### PURPOSE

The 3776 is a medium speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3776-3 and 3776-4 are SNA Multiple Logical Unit (MLU) terminals. A keyboard and a console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal set-ups and local utility programs in terminal storage for use by the terminal operator. The 3776 is not designed as an interactive terminal. The printer contains an engraved character font belt (48-, 64-, 94-, or 127-character set) which can be interchanged by the operator. A special feature provides for paper insertion from either the front or rear of the machine. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm.

### MODELS 3, 4

#### Model 3 003

Maximum LPM	Character Set
300	48
230	64
160	94
80	127 Katakana

#### Model 4 004

Maximum LPM	Character Set
400	48
300	64
230	94
160	127 Katakana

**Limitations:** The input/output capabilities outlined under "High-lights" are dependent on appropriate configurations of the terminal. Keyboard, console display, terminal storage and printer are standard. One communications feature (#3701, #4501, #5605 or #5651) is required. For other configurations, refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full-duplex communications facilities only.

**Prerequisites for SDLC Communications with S/370 or 4300 Processor:** A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370, 4331 or 4341 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS or VTAM. An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

### HIGHLIGHTS

- Keyboard: EBCDIC arrangement with (Canada only >44<) (Except Canada >47<) data keys for all countries except Japan (Katakana). Japan Katakana uses 48 data keys. The keyboard, in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display, provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are

non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

- Console Display: Contains 16 lines of 64 characters each for a total of 1024 characters. The 3776-3 and 3776-4 reserve the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input. Lower case alphabets are converted to upper case before displaying. Katakana machines provide for upper case Katakana characters only. When the cursor is beneath a character, any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted. Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time, the operator is prompted to specify date and time. As messages are received, they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state, a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

- Printer: Line printing is from characters engraved on a revolving belt. Included as standard is one interchangeable print belt (either 48-, 64-, 94- or 127-character set) -- see "Specify". Also standard are a variable width forms tractor for feeding continuous forms up to 15 inches wide, paper jam detection, and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch. Maximum print lines are 127 lines per page. Refer to GA24-3844 for forms design considerations.
- Forms Stand: Is integrated into the machine covers for the 3776 mdl 3 and 4.
- Terminal Storage: Is standard for message spooling, terminal control, utility programs and user-generated procedures.
- Diskette Storage: There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3776-1 and 3776-2, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.
- Magnetic Tape: May be used as either an input or as an output device. One 3411-1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411-1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-track tape operation is not provided. The 3411-1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4000 bytes. Maximum record size is 255 bytes. A block size of up to 2000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal

functions. Refer to G232-0004 for detailed information on operation of the 3411-1. Refer to M3411 for ordering information. Feature #7003 is required on the 3411 mdl 1.

- **Buffers:** Transfer data between the input and output devices and the communication line. SDLC communications uses a customer-defined Request/Response Unit (RU) of 256 or 512 byte buffer. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. Buffers also transfer data between input and output devices during local operation.
- **Printer Format Controls:** Facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.
- **Compression/Expansion:** Implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.
- **Decompression:** Provides the decompression function associated with the receipt of a compacted data stream whereby a pair of consecutive alphameric characters is represented by a single transmission byte. Function depends upon transmission by the host of a decompression table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompression occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided.
- **Automatic Card Reading:** Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.
- **Job Control:** Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printer, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printer, Diskette, Card Punch
Diskette	Printer, Magnetic Tape, Diskette, Card Punch

- **Record Formats:** Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic Exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 120 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

- **Remote Power Off:** See #9501 under "Specify" below.
- **Encrypt/Decrypt Feature:** Available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature (Program Number 5735-RC2) (Feature Number 6010) and Programmed Cryptographic Facility Program Product (Program Number 5740-XY5).

**Performance Considerations:** The line-to-printer performance of the 3776-3 is up to 300 lpm with a 48-character set print belt. The line-to-printer performance of the 3776-4 is up to 400 lpm with a 48-character set print belt.

The 3776-3 and 3776-4 MLU terminals will operate, however, with concurrent input-output processing in either a Duplex or Half Duplex data communications mode as a function of the base Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations. The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and system facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, cryptographic processing, etc., must all be considered in determining actual throughput.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3776-3 or 3776-4 operating Duplex at (Canada only > 19.2K bps <) (Except Canada > 20.4K bps <) on a terrestrial link may, however, present a variance of from greater to degrade overall terminal throughput when compared to comparable operation in a half-duplex mode.

**Problem Determination Procedures:** Function has been designed into this unit to help provide availability to the customer. See "IBM 3770 Multiple Logical Unit Operator's Guide for 3776-3, 3776-4, 3777-3", GA27-3125.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and to fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

**Communications:** See "Special Features" -- Transmission speeds from 2400 bps to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above (Canada only > 4800 <) (Except Canada > 9600 <) bps are on nonswitched facilities. Direct local attachment to 3705-II at 1.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. (Canada only > ASCII is available as a special feature. <) Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

Modem	Speed (bps)	Lines
3833 mdl 1	2400	Nonswitched voice grade
3834 mdl 1	4800	Nonswitched voice grade
3863 mdl 1/2	2400/1200	Nonsw or Sw voice grade
3864 mdl 1/2	4800/2400	Nonsw or Sw voice grade
3865 mdl 1/2	9600/4800	Nonswitched voice grade
3868 mdl 1	2400/1200	Nonswitched voice grade
3868 mdl 2	4800/2400	Nonswitched voice grade
3868 mdl 3/4	9600/4800	Nonswitched voice grade
5811 mdl 10	2400 to 9600	Limited Distance Modem
5811 mdl 18		Rack mount version of mdl 10
5811 mdl 20	2400 to 9600	Nonswitched baseband
5811 mdl 28		Rack mount version of mdl 20
5812 mdl 10	2400 to 9600	Nonswitched baseband
5812 mdl 18		Rack mount version of mdl 10
5865 mdl 2/3	9600/7200 4800	Nonswitched voice grade
5868 mdl 52		Rack mount version of 5865 mdl 2
5866 mdl 2/3	14400/9600	Nonswitched voice grade
5868 mdl 62		Rack mount version of 5866 mdl 1/2

**Note:** 4-wire Switched Network Backup is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire Switched Network Backup is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**Communications Adapter without Business Machine Clocking:** Standard -- integrated to provide SDLC communications over switched or nonswitched facilities.

**Bibliography:** GC20-0001

### SPECIFY

- (Canada only) Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug. See M3411 for Magnetic Tape Unit voltage requirements. <)
- Power (AC, 1-phase): One must be specified.

50 Hz	60 Hz
100V #2804	100V (#2730)
110V #2805	115V (#9901)
123.5V #2811	200V (#2732)
200V #2806	220V (#2803)
220V #2813	
235V #2814	

See M3411 for Magnetic Tape Unit power requirements.

- Power Cords: One must be specified.  
50 Hz cord without plug (#2760)  
60 Hz cord without plug (#2762)
- Color Group: Blue is supplied as standard except for field model conversions where installed color groups will be matched (do not specify).
- Language Group: One must be specified. Note: Not recommended for field installation.  
English #2927 Italian #2932  
French #2928 Japanese #2930  
German #2929 Spanish #2931
- Keyboard Arrangement: One must be specified. Note: Not recommended for field installation except for International (#2950) which may be field installed. International (#2950) is required if #2766 - 48-character set EBCDIC (HN Character Set) is specified at time of manufacture. International (#2950) may not be field removed. Also see "Print Belt, Add'l" in "Accessories".  
Brazilian #2975 Japanese #2955  
English UK #2958 Japanese #2955  
French #2970 Katakana #2973  
German #2957 Portuguese #2959  
Int'l #2950 Spanish #2960  
Italian #2968 Span Speak #2969
- Print Belt Character Set: Specify one. Available at time of manufacture only (specify for print belt to be shipped with machine). See "Print Belt" in "Accessories" for print belts available in addition to belt specified on order entry.

(Canada only >

#9489 48-character set EBCDIC (HN Character Set)\*  
#9490 48-character set EBCDIC (Standard Character Set)\*  
#9491 64-character EBCDIC  
#9492 94-character set EBCDIC  
#9493 48-character set ASCII\*\*  
#9494 64-character set ASCII\*\*  
#9495 94-character set ASCII\*\*

\* These belts are identical except for the special character differences:

HN Character Set has: ) ( =  
Standard Character Set has: % # @

\*\* ASCII Feature (#1201) is required. <)

(Except Canada >

#2766 48-character set EBCDIC (HN Character Set)\* \*\*  
#2767 48-character set EBCDIC (Standard Character Set)\*  
#2768 64-character set EBCDIC  
#2769 94-character set EBCDIC <)  
#2873 127-character set, Japan Katakana\*\*\*

(Except Canada >\* These belts are identical except for the special character differences:

HN Character Set has: ) ( =  
Standard Character Set has: % # @

\*\* International Keyboard Arrangement (#2950) required. <)

\*\*\* #2873 requires #2973. The Japan 48- or 64-character Print Belts (see "Accessories") can be used interchangeably with the 127-character Katakana print belt when #2873 is specified.

Print belts are interchangeable by the operator. The internal code structure adapts to the belt installed as follows:

Data  
Stream Printed

	Char		Char
HN Character Set Specified			
HN Belt Installed	) ( =	) ( =	
HN Belt Installed	% # @	) ( =	
Std Belt Installed	) ( =	% # @	
Std Belt Installed	% # @	% # @	

Std Character Set Specified			
Std Belt Installed	% # @	% # @	
Std Belt Installed	) ( =	- - -	
HN Belt Installed	% # @	) ( =	
HN Belt Installed	) ( =	- - -	

- Cabling: Fixed-length cables except for 3411 Magnetic Tape and Control are supplied as standard. Refer to "Installation Manual - Physical Planning", GA27-3006. 3411 cables must be separately ordered.
- Remote Power Off (#9501): This specify feature can be used to conserve energy used by the terminal by providing the capability for the host processor application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated.
- (Canada only>EIA RS-232C 19.2K bps Line Speed: #9481 -- provides support of 19.2K bps. <)
- (Canada only>Alternate Address (#9011): (For record purposes only) Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by<) (Canada only>CE<) (Canada only>using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location. <)

## SPECIAL FEATURES

All special features can be field installed. (Canada only>Field installation is not recommended for feature #1201. <)

**(Canada only>ASCII Feature (#1201):** A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). Maximum: One. Field Installation: Not recommended. Specify: Orders for #1201 must also specify one print belt, #9493 for 48-character ASCII, #9494 for 64-character ASCII, or #9495 for 94-character ASCII. <)

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One.

**CCITT-V35 Interface (#2911):** Provides a cable and interface compatible with CCITT-V35 recommendations for attachment of data communication equipment (see M2700 pages). Speed of (Canada only> 19.2K bps <) (Except Canada> 20.4K bps <) is permitted.

(Canada only>See the IBM Canada Data Communications Handbook for information. <) Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with a maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150.0m (491 ft). Limitations: Cannot be installed with #3701, #4501 or #5655. Maximum: One.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. Limitations: The keys provided for this lock can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One.

**Door Keylock, Dual (#3402):** Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with these locks can be duplicated by local key makers. Additional or replacement keys are not available from IBM. Maximum: One. Prerequisites: #4902.

**Encrypt/Decrypt (#3680):** Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. Maximum: One. Prerequisites: A mercury battery, IBM P/N 1743456 or equivalent is required. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

**(Canada only>EIA Interface (#3701):** Provides a cable and interface compatible with EIA RS-232C for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. Limitations: Cannot be installed with DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651), High-Speed Digital Interface (#4501), or V35 Interface (#4720). Maximum: One. Prerequisites: For 19.2K bps operation, #9481 is required -- see "Specify". <)

**(Except Canada>CCITT-V24/28 Interface (#3701):** Provides a cable and interface compatible with CCITT-V24/28 recommendations for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations (refer to M2700 Pages). Other external non-IBM modems may be attached subject to the Multiple System Supplier Bulletin. Speeds from 2400 bps to 9600 bps are permitted.

Limitations: Cannot be installed with <) (Except Canada>#4501 or #2911. <) #4501, #2911 or #5655. (Except Canada>Maximum: One. <) (Japan only>Specify: #2946 for NTPC Self-Test for use with DCE that is attached under the provisions of the IBM Multiple Supplier Systems Policy. <)

**Front Feed (#3951):** Enables the operator to insert paper forms in the front or rear of the machine. A forms entry chute is provided under the keyboard for front loading. The paper supply is placed on the floor either under the keyboard in the front of the machine for front loading, or underneath the forms enclosure for rear loading.

**High-Speed Digital Interface (#4501):** Provides a cable and interface for attachment to a modem which permits point-to-point and multipoint synchronous operation at (Canada only> 19.2K <) (Except Canada> 20.4K <) bps on a broadband channel. Limitations: Cannot be installed with #3701, #2911, or #5655. Maximum: One.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. See "Accessories" for information on additional or replacement keys. Maximum: One.

**Diskette Storage, 1st (#4901):** Provides one device with a customer removable diskette placed in the left desk cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: one movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format data set. Diskette capabilities allow for: Concatenate (pool) - the ability to concatenate on a data set basis -- Multivolume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive. Maximum: One.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the 1st. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Copy - data can be copied from Diskette 1 to Diskette 2. Maximum: One. Prerequisites: #4901.

**Operator ID Feature (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus

odd parity. Card size 3-3/8" x 2-1/8" ranging from 0.007" to 0.045" thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. Limitations: The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. Maximum: One.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides a cable and interface meeting CCITT X.21 characteristics for attachment of data communication equipment. Feature operates only over non-switched lines using SDLC procedures. Speeds of 2400, 4800 or 9600 bps are permitted. Limitations: 1) Japan DDC nonswitched Network only, 2) Not with #3701, #2911 or #4501. Maximum: One. Specify: (Record purposes only) #9822 for 2400 bps, #9823 for 4800 bps, or #9825 for 9600 bps.

**3411 Magnetic Tape Unit And Control Mdl 1 Attachment (#7801):** To attach one 3411 Magnetic Tape Unit and Control mdl 1. Maximum: One. Prerequisites: #7003 on the 3411-1.

**3782/2502 Card Reader Attachment (#8149):** To attach a 3782 Card Attachment Unit Mdl 2 and a 2502 Card Reader Mdl A1, A2, or A3. Limitations: OMR is not supported. Maximum: One.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit Mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. Limitations: The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One.

## MODEL CONVERSIONS

Changes from model 3 to model 4 are field installable.

**Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM."

## ACCESSORIES

The following accessories are available on a purchase-only basis. For shipment with machine, order the feature or P/N indicated below.

**Print Belt:** A metal belt with engraved font. Available in EBCDIC character arrangement for the countries listed in the table below. Character set sizes of 64 or 94 (96 positions of which 94 are printable) are available. See "Specify" for restrictions or limitations.

The belt can be interchangeably used with the one provided on the machine.

Order must contain two feature numbers, one from Table A and one from Table B.

Table A - Character Set Size

#2796	48-character set (HN Character Set)*
#2797	48-character set (Standard Set)
#2798	64-character set
#2799	94-character set
#5831	96-character Courier (WP-EBCDIC)
#5832	96-character Artisan (WP-EBCDIC)
#5833	128-character DP and WP (EBCDIC)

Table B - Country Arrangement

#2975	Brazil**	#2968	Italy
#2977	Canada Fr.**	#2955	Japan Eng.**
#2956	English US	#2973	Japan Katakana
#2958	English UK	#2960	Spain
#2970	France	#2969	Span Speak**
#2957	Germany	#2953	Text Print -
#2950	Int'l* **		EBCDIC-English
			US only

\* Country Arrangement International (#2950) must be used with 48-Character set (#2796) (HN Character Set).

\*\* Not available with #5831, #5832 or #5833.

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM. A customer letter of authorization with key identification number must accompany each order.

**Mercury Battery (P/N 1743456):** Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of 1 year under normal conditions, and can be expected to provide 3.5 years of normal operation. Additional or replacement batteries can be ordered from IBM. Note: Discharged batteries should be returned to IBM for disposal. Return information is printed on the label of the battery.

## SUPPLIES

**Ribbons:** A black ribbon, P/N 1136670, or equivalent, is required. Alternate P/N 1299160, or equivalent, incorporates a twist in the ribbon which may improve ribbon life if the major portion of printing is in the first 60 print positions. Contact IBM.

## 3777 COMMUNICATION TERMINAL MODEL 1

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 3777 mdl 1 is a high-speed remote job entry terminal and is a member of the 3770 Data Communication System. A keyboard is used for terminal control and may be used for operator communication with the host CPU. A printer is used for output. The 3777 mdl 1 is not designed as an interactive terminal. The printer is not integrated into the 3777 mdl 1 but is a stand-alone IBM 3203 mdl 3 printer which is cable-attached to the 3777 mdl 1. The 3203 mdl 3 uses the IBM 1416 Interchangeable Train Cartridge which can be interchanged by the operator. Special features permit one or two diskette storage devices, and provide for the attachment of one card reader. One of three card readers can be selected for operation at 150, 300 or 400 cards per minute. A minimum configuration includes a 3777 mdl 1 Communication Terminal and a 3203 Printer mdl 3.

Communication features permit operation at speeds of up to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps using BSC or SDLC transmission techniques and an appropriate modem. Direct Local Attachment to 3705-II at 14.4K bps or to a 3725 at 19.2K bps via appropriate features.

### Maximum Lines Per Minute

Standard 3203-3	Featured 3203-3	Character Set
1000	1200	48 AN, HN
870	1020	60 PN
717	815	107 Katakana
530	585	127 Katakana

See Type Catalog for additional character sets and speeds.

See M3203 pages for 1200 lpm Speed Enhancement feature information.

### MODEL 1

#### Model 1 001

**Limitations:** The input/output capabilities are dependent upon appropriate configurations of the terminal. Keyboard is standard on the 3777 mdl 1, while the 3203 Printer mdl 3 is a stand-alone unit. A minimum configuration includes a 3777 mdl 1 Communication Terminal and a 3203 Printer mdl 3.

**Prerequisites:** For SDLC Communications With S/370, 30XX or 4300 Processor: A 3704, 3705, or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 or 4300 Processor operating under VTAM or TCAM through VTAM with OS/VS1 or OS/VS2, VTAM with DOS/VS; or these operating systems running under VM/370.

For BSC Communications With S/360, S/370, 30XX or 4300 Processors: A virtual storage S/370 or 4300 Processor operating under BTAM or VTAM and DOS/VS, or under BTAM, TCAM or VTAM and OS/VS1 or OS/VS2; or under RSCS and VM/370; or any of these operating systems running under VM/370. The 3777 mdl 1 Communication Terminals use 2770/3780 BSC programming support when operating in BSC mode. Operation with S/360 or 4300 processor using 2770/3780 BSC programming is also permitted. See GA27-3097 for BSC compatibility considerations. The customer may have to modify existing 2770/3780 application programs for operation with 3777 mdl 1. BSC attachment can be via a 3704, 3705, or 3725 Communications Controller, or a 2701 Data Adapter Unit attached to a channel of any S/370 processor; or via an Integrated Communications Adapter on S/370 mdls 115, 125, 135, 135-3 or 138; or via a Communications Adaptor feature on the 4331 or 4361 Processor. BSC attachment can be made via a 3704/3705 attached to a channel

of a S/360 mdl 30, 40, 50, 65, 67 (in 65 mode), 75 or 195; via a 2701 attached to a channel of a S/360 mdl 22, 25, 30, 40, 44, 50, 65, 67 (in 65 mode), 75 or 195; or via an Integrated Communications Attachment on S/360 mdl 25.

For BSC Communications With System/38: All mdls of S/38 running under CPF (5714-SS1) featured with Communications Attachment (#1501 or #1502) and Communications Control, SDLC/BSC (#2001 or #2003). See "IBM System/38 Data Communications Programmer's Guide", SC21-7825, for BSC function and compatibility consideration.

### HIGHLIGHTS

- Keyboard: (Canada only > EBCDIC arrangement with 44 data keys (produces 88 characters). Underscore/Hyphen, Backspace, Space and Character Advance keys have typamatic action.) (Except Canada > All countries except Japan (Katakana) use EBCDIC arrangement with 47 data keys (producing 94 characters). Underscore/Hyphen, Backspace, Space, and Character Advance keys have typamatic operation. Japan Katakana uses 48 data keys in EBCDIC arrangement (producing 127 characters). Typamatic operation is provided for Backspace, Space, Tab, New Line and Character Advance.) Associated with the keyboard are indicator lights, function keys, operating mode switches, and a 3-position numeric display.
- Printer: A stand-alone 3203 mdl 3 Printer cable-attached to the 3777. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 1 supports fifteen Print Train Arrangements (AN, HN, OAA, ONA, ODA, OAB, GN, PCS-AN, PCS-HN, PN, QN, QNC, RN, SN, TN) as standard. When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces. Refer to the Type Catalog. If the International Print Support specify feature #9351 is installed, the 3777 mdl 1 will support Print Train Arrangements corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN and PCS-HN, 107- and 127- character Japanese Katakana Print Train (see Type Catalog) arrangements. The 3203 mdl 3 accepts continuous forms of up to 20 inches wide and 132 print positions. Character spacing is 10 per inch; line spacing is 6 or 8 per inch under operator control. Maximum print lines are 127 per page when attached to the 3777 mdl 1. Refer to M3203 pages for further description of the 3203 mdl 3 Printer. Refer to Type Catalog for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.
- Buffers: Transfer data between the input and output devices and the communication line. The buffers also transfer data between input and output devices during offline operation. Buffers alternate in providing input and output services to permit overlapped operation. Dual 256-byte or 512-byte buffers are used for BSC or SDLC operation and are under operator control.
- Printer Format Controls: Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing.
- Compression/Expansion: Provides a means for improving the efficiency of data transmission. For BSC, the compression option can be invoked at the terminal for a job that reads non-transparent data from card and diskette. A two-byte sequence is substituted for each occurrence of three or more consecutive blank bytes (63 consecutive blanks is the upper limit). A second two-byte sequence is appended if more than 63 consecutive blank bytes are read. Incoming non-transparent data (destined for the printer) is monitored

by the terminal which automatically expands this two-byte sequence to the correct number of blanks.

SDLC implementation provides a compression option at the terminal for a job that reads data from cards or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. The terminal automatically expands the compression sequence to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received.

- **Decompression:** Provides the decompression function associated with the receipt of a compacted data stream whereby a pair of consecutive alphanumeric characters is represented by a single transmission byte. Function is dependent upon transmission receipt, and subsequent 3777 mdl 1 storage, of a decompression table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompression function is available only under SDLC operation. Decompression occurs only for data directed to the printer. Compaction by the 3777 mdl 1 of data inbound to the host is not provided.
- **Transmission Reversal:** Data transmission from the host may be temporarily interrupted, via the keyboard, to permit data transmission from the terminal. When the terminal has completed its data transmission, the host automatically resumes its own transmission of data. This function is dependent upon associated host programming.
- **Record Compress:** Using two special feature diskette storage devices permits offline compression of Basic Exchange diskette records onto a single 3777 mdl 1 diskette for subsequent batch transmission. The compressed records are written on the 3777 diskette in 3770 mode. Record Compress, using one diskette storage device, permits the compression of basic exchange diskette records into blocks of up to 256 or 512 bytes for transmission.
- **Dual Data Path:** Provides for concurrent operation of a line-to-print primary job and a card reader-to-diskette or diskette-to-diskette secondary job. The line-to-printer job uses either the dual 256-byte or dual 512-byte alternating buffers to accept data from the line for printing. A single 256-byte or single 512-byte buffer is used for data buffering between card-and-diskette or diskette-and-diskette. The primary line-to-printer job will not normally be degraded during Dual Data Path operation. The secondary job will be degraded during periods of concurrent operation.
- **Automatic Card-to-Line Job:** When an online job is completed and the 3777 goes into Standby Status, a reader-to-line job is automatically started. The Start-Job procedure is not required provided the terminal has a 2502 Card Reader and it is in Ready Status.
- **Remote Power Off:** This feature can be used to conserve energy. The host CPU application program can initiate "power down" at the terminal by sending a controlled data sequence over communication special facilities. The terminal must also be equipped with the appropriate special communication features. This capability is in addition to the standard, manually operable "power down" switch.
- **Input/Output Form Definitions:** Can be operator or terminal defined. Up to five operator defined forms settings can be read from diskette or card reader to facilitate rapid job set-up when the terminal is equipped with either of the special features, otherwise they can be entered from keyboard. Printer format controls can be part of the job definition. An appropriately configured 3777 mdl 1 will permit input/output job designation as follows:

	Input	Output
Offline Jobs	Diskette(1)	Printer or Diskette
	Card Reader(1)	Printer or Diskette

Online Batch Jobs	Diskette or Card Reader(1) Line(1)	Line Printer or Diskette
Dual Data Path Jobs	Line(2) Card Reader(2) Diskette(2)	Printer Diskette Diskette

1. One input device and one output device per job.
2. Line-to-printer occurs concurrently with card reader-to-diskette or diskette-to-diskette.

**Performance Considerations** Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See "IBM 3770 Data Communication System", GA27-3097, for additional information.

**Problem Determination Procedures:** These are easily understood problem identification routines and procedures for use by the operator. See "IBM 3777-1 Operating Procedures Guide", GA27-3124.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

**Communications:** See "Special Features". Transmission speeds of up to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps are allowed by selecting the appropriate modem and communication facility. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. Refer to S3770 pages for a Communication Configurator. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

(Canada only > For 19.2K bps the 3777 mdl 1 may use either the EIA or the High-Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA or RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature on the 4331 Processor. See M4331 pages for details. <)

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

**Note:** 4-wire Switched Network Backup is available on 3863, 3864 and 3865. For communications capability, product utilization and features, see M3863, 3864 and 3865 pages.

**Publications:** GC20-0001

## SPECIFY

- (Canada only > Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug. See 3203 mdl 3 for 3-phase power requirements. <)

- Power (AC, 1-phase): One must be specified.

	50 Hz	60 Hz
100V	#2804	100V #2730
110V	#2805	115V #9901

123.5V	#2811	200	#2732
200V	#2806	220V	#2803
220V	#2813		
235V	#2814		

See M3203-3 pages for 3-phase power requirements.

- Power Cords: One must be specified.

50 Hz cord without plug - #2760  
60 Hz cord without plug - #2762

- Color Group: Blue is supplied as standard.
- Language Group: One must be specified.

English	#2927	Japanese	#2930
French	#2928	Italian	#2932
German	#2929	Spanish	#2931

**Note:** Not recommended for field installation.

- Keyboard Arrangement: One must be specified.

Brazilian	#2975	Italian	#2968
English UK	#2958	Japanese	#2955
French	#2970	Japan Katakana	#2973
German	#2957	Spanish	#2960
Int'l	#2950	Spanish Speak	#2969

**Note:** Not recommended for field installation.

- International Print Support (#9351): Provides support for modified AN, PN and SN Print Train Arrangements for the 1416 Interchangeable Train Cartridge corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN, 107- and 127-character Katakana Print Train Arrangements. See "Type Catalog".  
**Note:** Not recommended for field installation. Replaces standard print support.
- Cabling: Fixed-length cables are supplied as standard. Refer to "Installation Manual-Physical Planning", (Except Canada > GA27-3006 <) (Canada only > and to "Customer Site Preparation Planning Guide", GA27-3103. <)
- (Canada only > EIA RS-232-C 19.2K bps Line Speed: #9481 --- provides support of 19.2K bps. Provides diagnostics <)

### SPECIAL FEATURES

#### Communication Features

For Communication Capability, select one of the following Communication features (#1460, #1461 or #1470); a Communication Driver (#1481); and (Canada only > EIA Interface (#3701) or High-Speed Digital Interface (#4501) <) CCITT-V24/28 Interface (#3701), CCITT-V35 Interface (#2911), or High-Speed Digital Interface (#4501) or X.21 Adapter for Nonswitched Networks (#5655). BSC Multipoint (#1462) is required in addition to #1460 or #1461 for multipoint operation using BSC.

**SDLC/BSC, Switch Control (#1460):** Provides communication procedure using SDLC or BSC under operator switch control. SDLC allows point-to-point or multipoint operation. BSC operation is point-to-point without #1462, multipoint with 1462. Limitations: Cannot be installed with #1461 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One. Field Installation: Yes.

**Point-To-Point (#1461):** Provides for point-to-point BSC operation over switched or nonswitched facilities. Limitations: Cannot be installed with #1460 or #1470. See GA27-3097 for BSC compatibility considerations. Maximum: One. Field Installation: Yes.

**BSC Multipoint (#1462):** Required for BSC multipoint operation over nonswitched facilities. Limitations: See GA27-3097 for BSC com-

patibility considerations. Maximum: One. Field Installation: Yes. Prerequisites: #1460 or #1461.

**SDLC (#1470):** Provides for switched and nonswitched SDLC procedures. Specify one of the following: #9977 for DOS/VS VTAM, #9988 for OS/VS1 VTAM, #9989 for OS/VS2 VTAM, or #9993 for all other combinations of operating systems and access methods. Limitations: Cannot be installed with #1460 or #1461. Maximum: One. Field Installation: Yes.

**Communication Driver Without Business Machine Clocking (#1481):** Provides communication driver without clocking. Maximum: One. Field Installation: Yes. Prerequisites: Communication Feature (#1460, #1461 or #1470).

**CCITT-V35 Interface (#2911):** Provides a cable and interface compatible with CCITT-V35 recommendations for attachment of Data Communication Equipment (see M2700 pages). Speed of 20.4K bps is permitted. Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet. Field Installation: Yes. Prerequisites: #1481. Limitations: Cannot be installed with #3701, #4501, or #5655.

**(Canada only > EIA Interface (#3701):** Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. Limitations: Cannot be installed with #4501 <) (Canada only > Maximum: One. Prerequisites: For 19.2K bps operation, #9481 is required. See item under "Specify". <)

**(Except Canada > CCITT-V24/28 Interface (#3701):** Provides a cable and interface compatible with CCITT-V24/28 recommendations for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations (refer to M2700 pages). Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds from 2400 bps to 9600 bps are permitted. Limitations: Cannot be installed with #4501 or #2911. <) or #5655.

**(Except Canada > Maximum: One. Field Installation: Yes. Prerequisites: #1481. <) (Japan only > Specify: #2946 for NTTPC Self-Test for use with DCE that is attached under the provisions of the IBM Multiple Supplier Systems Policy. <)**

**High-Speed Digital Interface (#4501):** Provides an interface and a cable for attachment to a modem which permits point-to-point synchronous operation at (Canada only > 19.2K bps on a Type 5703 or 8803 wideband <) (Except Canada > 20.4K bps on a broadband <) channel. Limitations: Cannot be installed with #3701 or #2911 or #5655. Maximum: One. Field Installation: Yes. Prerequisites: #1481.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides cables and interface meeting CCITT-X.21 characteristics for attachment of data communication equipment. Feature operates only over non-switched lines using SDLC procedures. Speeds of 2400, 4800 or 9600 bps are permitted. Limitations: 1) Japan DDC Nonswitched Network only. 2) Not with #3701, #2911 or #4501. Maximum: One. Prerequisites: #1481 and #1470. Specify: #9822 for 2400 bps, #9823 for 4800 bps, or #9825 for 9600 bps.

#### Non-Communication Features

**(Canada only > ASCII Feature (#1201):** A 48 data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette) and with BSC features #1460, #1461 or #1462 or with SDLC features #1460 or #1470. A #1416 interchangeable Train Cartridge containing an ASCII GN print train is required for the 3203 Printer mdl 3 if 1201 is ordered for the 3777. Maximum: One. Field Installation: Not recommended. <)

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One. Field Installation: Yes.

**MACHINES**

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. Limitations: The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. Maximum: One. Field Installation: Yes.

**Door Keylock, Dual (#3402):** Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. Maximum: One. Field Installation: Yes. Prerequisites: #4902.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to input, output or control of data at the terminal. Each machine will have its own unique key. Two identical key are supplied with the feature. See "Accessories" for information on additional or replacement keys. Maximum: One. Field Installation: Yes.

**Diskette Storage, 1st (#4901):** This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Characteristics of the diskette storage device are: One movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 949 256-byte records, or 474 512-byte records can be stored on the diskette (one 256-byte data record is reserved for forms control information). Each 256-byte record is stored in two consecutive numbered sectors in exchange mode, or in two non-consecutive sectors in 3770 mode. Each 512-byte record is stored in four consecutive numbered sectors in exchange mode, or four non-consecutive sectors in 3770 mode. Diskette data is code-insensitive in SDLC mode, non-transparent only in BSC mode. Maximum: One. Field Installation: Yes.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Copy - Data can be copied from diskette 1 to diskette 2 (single data set or all active data sets - 3770 mode only). Concatenate (Pool) - The ability to concatenate on a data set basis. Continue - Allows a read or write operation to automatically continue onto diskette 2 if it has been placed in "ready" condition. Maximum: One. Field Installation: Yes. Prerequisites: #4901.

**Operator Identification Reader (#5450):** Reads 40 characters (of which 37 are discretionary) from magnetic-stripe cards which are encoded in the ABA format. Each character contains four bits plus odd parity. Card size is 3-3/8 inches by 2-1/8 inches, and cards ranging in thicknesses of from 0.007 inches to 0.045 inches thick may be read. Contact IBM for magnetically striped and encoded identification cards. With BSC, a read operation can be initiated during a keyboard-to-line job only. Data read from the magnetic-stripe card cannot be printed. Limitations: (1) The operator must position and slide the card through the reader-slot at a steady rate of between 5 and 40 inches per second for a read operation. (2) BSC programming for 2770 and 3780 does not support this feature. Maximum: One. Field Installation: Yes.

**Print Speed Enhancement (#5595):** Provides support for 3203 Printer mdl 3 operating with 1200 lpm Speed Enhancement feature (#6360). Maximum: One. Field Installation: Yes.

**2502 Card Reader Attachment (#8002):** Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. Maximum: One. Field Installation: Yes.

**MODEL CONVERSIONS**

The following model upgrades are field installable: Mdl 1 to mdl 2 and mdl 2 to mdl 3. Note: Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this model change involves removal of parts which become the property of IBM".

**ACCESSORIES**

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order.

**SUPPLIES**

**Ribbons:** For 3203 mdl 3 ribbons, contact IBM.

## 3777 COMMUNICATION TERMINAL MODEL 2

### PURPOSE

The 3777 mdl 2 is a high speed remote job entry terminal which operates as a S/360-20 Submodel 5 BSC MULTI-LEAVING Workstation. A keyboard is used for terminal control and may be used for operator communication with the host CPU. A 3203 mdl 3 Printer is used for output. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge which can be interchanged by the operator. Special features provide for the attachment of one 1024-character console display, one diskette storage device for logging of card image messages, one diskette Storage Device for reading of card image Basic Exchange datasets (processed as 80-column card images), one card reader and one card punch. One of three 2502 Card Reader models can be selected for operation at 150, 300 or 400 cards per minute. The 3521 card punch operates at 50 cpm. A minimum configuration includes a 3777 mdl 2 Communication Terminal, a 3203 Printer mdl 3 and a 2502 Card Reader or a Diskette Input Device (#3201). If a Diskette Input Device is attached and a 2502 Card Reader is not present, a Console Display (#1601) is required. A console display is also required if the keyboard is to be used for operator console communication with the host processor.

Communications features permit operation at speeds of up to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) using BSC transmission techniques and an appropriate modem. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps via appropriate features.

### MODEL 2

#### Maximum Lines Per Minute

Standard	Featured	Character Set
3203-3	3203-3	
1000	1200	48 AN, PN
870	1020	60 PN
717	815	107 Katakana
530	585	127 Katakana

See Type Catalog for additional character sets and speeds.

See M3203 pages for 1200 lpm Speed Enhancement feature information.

**Limitations:** The input/output capabilities outlined under "Highlights" are dependent on appropriate configurations of the terminal. Keyboard is standard on the 3777 mdl 2 while the 3203 Printer is a stand-alone unit. A minimum configuration includes a 3777 Communication Terminal mdl 2, a 3203 Printer mdl 3 and a 2502 Card Reader or a Diskette Input Device (#3201). If a Diskette Input Device is attached and a 2502 Card Reader is not present, a Console Display (#1601) is required.

**Prerequisites:** For BSC Communications with S/360 or 4300 Processor: The 3777 mdl 2 will interface to current host MULTI-LEAVING programming systems as a S/360-20 Submodel 5. BSC attachment can be made via a 3704/3705 Communications Controller, a 2701 Data Adapter Unit or a 2703 Transmission Control attached to a channel of any S/360, or S/370, supporting BSC MULTI-LEAVING Workstations. Also attaches via a Communications Adapter feature on the 4331 Processor.

### HIGHLIGHTS

- Keyboard: (Canada only > EBCDIC arrangement with 44 data keys (produces 88 characters). Space and Character Advance keys have typamatic action. <) All countries except Japan Katakana use EBCDIC arrangement with 47 data keys (producing 94 characters). Space and Character Advance keys have typamatic operation. Japan Katakana uses 48 data keys in EBCDIC arrangement (producing 127 characters). As-

sociated with the keyboard are: indicator lights, function keys, operating mode switches, and a 3-position numeric display. The keyboard, in conjunction with the optional console display, provides a console function for the 3777 mdl 2.

- Printer: A stand-alone 3203 Printer mdl 3 cable attached to the 3777 mdl 2. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 2 supports 15 Print Train Arrangements (AN, HN, OAA, ODA, ONA, OAB, GN, PCS-AN, PCS-HN, PN, QNC, QN, RN, SN, TN) as standard.

If the International Print Support specify feature is installed, the 3777 mdl 2 will support Print Train Arrangements corresponding to the 48-, 64- and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PSC-HN, 107- and 127- character Japan Katakana Print Train (see Type Catalog) arrangements. The 3203 Printer mdl 3 permits feeding continuous forms up to 20 inches wide and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch under operator control. Maximum form length is 24 inches when attached to the 3777 mdl 2. Refer to the 3203 write up for further description of the 3203 mdl 3. Refer to Type Catalog for further description of the 1416 print train arrangements supported and for print speeds. Refer to GA24-3488 for forms design considerations.

- Console Display: Contains up to 1024 characters of information formatted into 16 lines of 64 character positions each. Operator messages are displayed in the top 14 lines of the display. Operator originated keyboard data is displayed in the bottom two lines of the display and will be displayed as keyed. Katakana machines provide for upper case Katakana characters only on the console display.

Operator messages larger than 64 characters overflow to subsequent lines. Subsequent lines of the message are indented. The latest message displayed is identified with a special character. If the display becomes full, the oldest message is overlayed retaining the most recent messages on the display. The operator may defer subsequent messages in order to complete reference to a particular message.

- Console Display Spooling: A diskette storage device may be attached to the 3777 mdl 2 by special feature to provide storage for operator console messages. Two options are available to the operator when the diskette becomes filled. First, automatic rewrite occurs. New messages are overlaid upon older messages commencing with the initial message written upon the diskette. Second, an end of diskette signal is provided to the operator and messages are suspended pending replacement of the used diskette by a new diskette. The diskette may also be used to IPL the 3777 in lieu of the 2502 once the workstation program has been written on the diskette from a card reader.

Operator access to the diskette is via the keyboard. The diskette may be paged backward a defined number of messages and displayed for reference. In addition, the diskette may be written to the printer.

- Diskette Input Device: A diskette storage device may be attached to the 3777 mdl 2 by special feature for reading of card image Basic Exchange datasets. Basic Exchange datasets will be processed by the 3777 mdl 2 as 80-column card images. The datasets may be multivolume. Individual datasets or all active datasets may be read. Volume label and dataset labels may be printed. Initial Program Load of the workstation program may take place from the Diskette Input Device if the Console Spool Device is not present. Diskette IPL must take place from the Console Spool Device if both diskette devices are present. IPL is available from the 2502 Card Reader if that device is attached.

If the 3777 mdl 2 configuration includes both a 2502 Card Reader and the Diskette Input Device, diskette input may be alternated with cards; however, both devices will not operate

simultaneously. If the 3777 mdl 2 configuration includes a Diskette Input Device instead of a 2502 Card Reader, and IPL is executed from the Diskette Input Device or the Console Spool Device, the IPL diskette containing the workstation program must have been written on a 3777 mdl 2 configuration containing a 2502 Card Reader and a diskette device.

- **Buffers:** Transfer data between the input and output devices and the communication line. The buffers alternate in providing input and output services to permit overlapped operation. Storage is provided in the 3777 mdl 2 for dual buffers for each input and output device attached. The buffer size is variable, dependent upon the workstation program. The recommended buffer size is 512-bytes.

- **Communications Adapter:** Integrated to provide and BSC point-to-point operation over switched or nonswitched facilities.

- **Printer Format Controls:** Facilitate the formatting of printed data. Vertical forms definition provides forms set-up for the printer by means of the keyboard or card reader. The definition may be displayed on the console display, if present, or printed for verification.

Extended forms definition may be used in conjunction with the Diskette Input Device (#3201). Standard forms definition provide for the definition of five printer forms. Extended forms definition provides for greater than five printer forms. The Diskette Input Device (#3201) is a prerequisite to the use of extended forms definition.

- **Compression/Expansion:** Provides a means for improving the efficiency of data transmission. Provides options of (dependent upon the workstation program) trailing blank truncation, blank or data compression/expansion.

- **Performance Considerations:** The line-to-printer performance of the 3777 mdl 2 and attached 3203 Printer mdl 3 is up to 1,000 lpm (up to 1200 lpm with 3203 mdl 3 Speed Enhancement feature) with 48-character AN or HN set and up to 870 lpm (up to 1020 lpm with 3203 mdl 3 Speed Enhancement feature) with a 60 character PN set. The 3777 mdl 2 may operate, however, with concurrent input/output processing as a function of the MULTI-LEAVING capability. The card reader, punch and display console may have a degrading effect on printer performance while transferring data to and from the 3777 mdl 2 buffers and the host as communications line time is shared by all 3777 mdl 2 I/O units.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, etc., must all be considered in determining actual throughput. See "3770 Data Communication System", GA27-3097, for additional information.

- **Problem Determination Procedures:** Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See "IBM 3777-2 Operating Procedures Guide", GA27-3129.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 pages.

**Communications:** See "Special Features". Transmission speeds of up to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps. Point-to-point transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are on nonswitched facilities. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the only supported transmission code. Refer to M2700 pages for information on

customer responsibilities, communication facilities, and other attachment information.

(Canada only > For 19.2K bps the 3777 mdl 2 may use either the EIA or the High Speed Digital Interface to communicate through an appropriate modem and communication facility with a 3704/3705 Communications Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection) and which provide optional EIA or RS-232-C or High Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature on the 4331 Processor see M4331 pages for details. <)

Modem	Speed (bps)	Lines
3833 mdl 1	2400	Nonswitched voice grade
3834 mdl 1	4800	Nonswitched voice grade
3863 mdl 1/2	2400/1200	Nonsw or Sw voice grade
3864 mdl 1/2	4800/2400	Nonsw or Sw voice grade
3865 mdl 1/2	9600/4800	Nonswitched voice grade
3868 mdl 1	2400/1200	Nonswitched voice grade
3868 mdl 2	4800/2400	Nonswitched voice grade
3868 mdl 3/4	9600/4800	Nonswitched voice grade
5811 mdl 10	2400 to 9600	Limited Distance Modem Rack mount version of mdl 10
5811 mdl 18		Nonswitched baseband Rack mount version of mdl 20
5811 mdl 20	2400 to 9600	Nonswitched baseband Rack mount version of mdl 20
5811 mdl 28		Nonswitched baseband Rack mount version of mdl 20
5812 mdl 10	2400 to 9600	Nonswitched baseband Rack mount version of mdl 10
5812 mdl 18		Nonswitched voice grade Rack mount version of 5865 mdl 2
5865 mdl 2/3	9600/7200 4800	Nonswitched voice grade Rack mount version of 5865 mdl 2
5868 mdl 52		Nonswitched voice grade Rack mount version of 5866 mdl 1/2
5866 mdl 2/3	14400/9600	Nonswitched voice grade Rack mount version of 5866 mdl 1/2
5868 mdl 62		

**Note:** 4-wire Switched Network Backup is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire Switched Network Backup is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**Publications:** GC20-0001

### SPECIFY

- (Canada only > Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug. See M3203 mdl 3 pages for 3-phase power requirements. <)
- Power (AC, 1-phase): One must be specified.

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811	200V	#2732
200V	#2806	220V	#2803
220V	#2813		
235V	#2814		

See M3203-3 pages for 3-phase power requirements.

- Power Cords: One must be specified.

50 Hz cord without plug - #2760  
60 Hz cord without plug - #2762

- Color Group: Blue is supplied as standard.
- Language Group: One must be specified.

English	#2927	Italian	#2932
French	#2928	Japanese	#2930
German	#2929	Spanish	#2931

**Note:** Not recommended for field installation.

- Keyboard Arrangement: One must be specified.

Aust./Ger.	#2957	Italian	#2968
Belgian	#2971	Japanese	#2955
Brazilian	#2975	Japan Katakana	#2973
Danish	#2965	Norwegian	#2966
English UK	#2958	Portuguese	#2959
Finnish	#2963	Spanish	#2960
French	#2970	Span. Speak	#2969
Int'l	#2950	Swedish	#2967

**Note:** Not recommended for field installation.

- International Print Support (#9351): Provides support for modified AN, PN and SN Print Train Arrangements for the 1416 Interchangeable Train Cartridge corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN, 107- and 127-character Katakana Print Train Arrangements. See "Type Catalog". Not recommended for field installation. Replaces standard print support.
- Cabling: Fixed-length cables are supplied as standard. Refer to "Installation Manual-Physical Planning", GA27-3006 (Canada only) and to "Customer Site Preparation Planning Guide", GA27-3103. (<)
- (Canada only) EIA RS-232-C 19.2K bps Line Speed: #9481 provides support of 19.2K bps. Provides diagnostics (<)

## SPECIAL FEATURES

### Communication Features

**Communication Driver Without Business Machine Clocking (#1481):** (Required) Provides communication driver without clocking. Maximum: One. Field Installation: Yes.

**CCITT-V.35 Interface (#2911):** Provides a cable and interface compatible with CCITT-V.35 recommendations for attachment of Data Communication Equipment (see M2700 pages). Speed of (Except Canada > 20.4K <) (Canada only > 19.2K <) bps is permitted. Required for direct High-Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150m (491 ft). Limitations: Cannot be installed with #3701, #4501.

Contact IBM for information. Field Installation: Yes. Prerequisites: Communication Driver without Clocking (#1481).

**EIA Interface (#3701):** Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps

to 9600 bps and at 19.2K bps are permitted. Limitations: Cannot be installed with High Speed Digital Interface (#4501), DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multipoint (#5651) or V.35 Interface (#4720). (Canada only) Maximum: One. Prerequisites: For 19.2K bps operation, #9481 is required see item under "Specify". (<)

**(Except Canada > CCITT-V.24/28 Interface (#3701):** Provides a cable and interface compatible with CCITT-V.24/28 recommendations for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations (refer to M2700 pages). Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds from 2400 bps to 9600 bps are permitted. Limitations: Cannot be installed with #4501 or #2911.

Maximum: One. Field Installation: Yes. Prerequisites: Communication Driver (#1481). (<) (Japan only) Specify: #2946 for NTPC Self-Test for use with DCE that is attached under the provisions of the IBM Multiple Supplier Systems Policy. (<)

**High-Speed Digital Interface (#4501):** Provides an interface and a cable for attachment to a modem which permits point-to-point synchronous operation at (Canada only > 19.2K bps on a Type 5703 or 8803 wideband <) (Except Canada > 20.4K bps on a broadband <) channel. Limitations: Cannot be installed with #3701 or #2911. Maximum: One. Field Installation: Yes. Prerequisites: #1481.

### Non-Communication Features

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One. Field Installation: Yes.

**Console Display (#1601):** Provides a 1024-character (16 lines of 64 characters each) console information display. Maximum: One. Field Installation: Yes.

**Console Display Spooling (#1602):** Diskette storage device for spooling of console display messages. One device with a customer removable diskette placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Maximum: One. Field Installation: Yes. Prerequisites: #1601.

**Diskette Input Device (#3201):** Diskette storage device for reading of card image Basic Exchange Datasets. One device with a customer removable diskette placed in the right cabinet. Additional diskettes are available from IBM. Contact IBM. Maximum: One. Field Installation: Yes.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk console cabinet door. Limitations: The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. Maximum: One. Field Installation: Yes.

**Door Keylock Dual (#3402):** Provides two Keylocks and four identical keys for both desk-console cabinet doors. Limitations: The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. Maximum: One. Field Installation: Yes. Prerequisites: #3201.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to input, output, or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to "Accessories" for information on additional or replacement keys. Maximum: One. Field Installation: Yes.

**Operator ID Reader (#5450):** Provides for reading magnetic stripe cards encoded in the ABA format to permit reading of 40 characters of which 37 are discretionary. Each character contains four bits plus odd parity. Card size 3-3/8 inches x 2-1/8 inches ranging from 0.007 inches to 0.045 inches thick may be read. Contact IBM for magnetically striped and encoded identification cards. A read operation can be initiated during an operator inquiry (SYSREQ function). Data read from the magnetic stripe card cannot be printed, displayed or

## MACHINES

written on the Console Display Spooling diskette. Limitations: (1) The operator must position and slide the card through the reader-slot at a steady rate between 5 and 40 inches per second for a read operation. (2) BSC programming does not support this feature. Maximum: One. Field Installation: Yes. Prerequisites: #1601.

**Print Speed Enhancement (#5595):** Provides support for 3203 mdl 3 Printer operating with 1200 lpm Speed Enhancement feature (#6360). Maximum: One. Field Installation: Yes.

**2502 Card Reader Attachment (#8002):** Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. Maximum: One. Field Installation: Yes.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. Limitations: The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS

The following model upgrades are field installable:

Mdl 1 to mdl 2

Mdl 2 to mdl 3 (Canada only > \*\* <)

(Canada only > \*\* When upgrading a mdl 2 to a mdl 3, it is assumed that the mdl 2 has Special Features #1601 (Console Display) and

#1602 (Console Display Spooling) installed. If they are not, an RPQ must be submitted. <)

**Note:** Customer price quotations and customer order acknowledgement letters for purchase MESs must state: "Installation of this mdl change involves removal of parts which become the property of IBM."

## ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the P/N indicated below.

**Mercury Battery (P/N 1743456):** Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of one year under normal conditions, and can be expected to provide 3.5 years of normal operation. Note: Discharged battery should be returned to IBM.

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order.

## SUPPLIES

**Ribbons:** For 3203 mdl 3 ribbons, contact IBM.

## 3777 COMMUNICATION TERMINAL MODEL 3

### PURPOSE

The 3777 mdl 3 is a high-speed remote job entry terminal and is a member of the 3770 Data Communication System. The 3777 mdl 3 is an SNA Multiple Logical Unit (MLU) terminal. A keyboard and console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3777 is not designed as an interactive terminal. The printer is not integrated into the 3777 mdl 3 but is a stand-alone 3203 Printer mdl 3 which is cable-attached to the 3777 mdl 3. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader and one card punch. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operates at 50 cpm. A minimum configuration includes a 3777 mdl 3 Communication Terminal and a 3203 mdl 3 Printer.

### MODEL 3

#### Maximum Lines Per Minute

Standard 3203-3	Featured 3203-3	Character Set
1000	1200	48 AN, PN
998	1195	52 PN
870	1020	60 PN
717	815	107 Katakana
530	585	127 Katakana

**Note:** Katakana character set print speeds are dependent upon the frequency of preferred character subsets.

See "Type Catalog" for additional character sets and speeds. See M3203 for 1200 lpm Speed Enhancement feature information.

**Limitations:** The input/output capabilities outlined under "High-lights" are dependent upon appropriate configurations of the terminal. Keyboard, console display and terminal storage are standard. The 3203 and 3262 Printers are stand-alone units. A minimum configuration includes a 3777 mdl 3 Communication Terminal and a 3203 Printer mdl 3. For other configurations refer to "Special Features" below. The duplex data communications capability of the 3776-3, -4, 3777-3 is operational on nonswitched full-duplex communications facilities only.

**Prerequisites:** For SDLC Communications with S/370 or a 4300 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 processor or 4300 processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, POWER/VS and VTAM.

**Note:** 4300 MVS and JES2-3 support is limited to 4341 4361 or 4381 Processors.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for duplex data stream operation.

### HIGHLIGHTS

- **Communications:** Transmission speeds from 2400 bps to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps are provided using the appropriate modems and communications facilities. Duplex -- simultaneous inbound/outbound -- data transmission is provided on nonswitched full-duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Control-

ler with the supporting ACF/NCP/VS level. May also be locally attached in either a Duplex or Half-Duplex mode to a 3705 at 14.4K bps or a 3725 at 19.2K bps.

- **Keyboard:** EBCDIC arrangement with (Canada only > 44 data keys. <) (Except Canada > 47 data keys for all countries except United Kingdom and Japan (Katakana). United Kingdom and Japan Katakana use 48 data keys. <) The keyboard in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character Advance may be used for editing. Character Backspace and Advance are non-destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.
- **Console Display:** Contains 16 lines of 64 characters each for a total of 1,024 characters. The 3777 mdl 3 reserves the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input.

Lower case alphabets are converted to upper case before displaying. Katakana machines provide for upper case Katakana characters only. When the cursor is beneath a character any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time the operator is prompted to specify date and time. As messages are received they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the "greater than" symbol in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

- **Printer:** A stand-alone 3203 Printer mdl 3 cable attached to the 3777 mdl 3. The 3203 mdl 3 uses the 1416 Interchangeable Train Cartridge. The 3777 mdl 3 supports 15 Print Train Arrangements (AN, HN, OAA, ODA, ONA, OAB, GN, PCS-AN, PCS-HN, PN, QNC, QN, RN, SN, RN) as standard. When a substitute character is ordered to displace a character in one of the standard arrangements, the substitute character assumes the card and bit codes of the character it replaces. See "Type Catalog" pages. International Print Support is provided supporting Print Train Arrangements corresponding to the 48-, 64-, and 94-character EBCDIC sets available for print belts for the 3776 Communication Terminal. Support is also provided for the QN, HN, AN, PN, RN, PCS-HN, 107 and 127 character Katakana arrangements. The 3203 mdl 3 permits feeding continuous forms up to 20 inches wide and 132 print positions. Character spacing is 10 per inch, line spacing is 6 or 8 per inch under operator control. Maximum forms length is 24 inches when attached to the 3777 mdl 3. Refer to 3203 for further description of the 3203 mdl 3. Refer to "Type Catalog" for further description of the 1416 print train arrangements supported

and for print speeds. Refer to GA24-3488 for forms design considerations.

- **Terminal Storage:** Is standard for message spooling, terminal control, utility programs and user-generated procedures.
- **Diskette Storage:** There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3777 mdl 1, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned individually to an independent host SNA session or used locally for input or output. Diskette operation is concurrent with other terminal functions.
- **Magnetic Tape:** May be used as either an input or as an output device. One 3411 mdl 1 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411 mdl 1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. 7-Track tape operation is not provided. The 3411 mdl 1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed- or variable-length and may be unblocked or blocked to a maximum block size of 4,000 bytes. Maximum record size is 255 bytes. A block size of up to 2,000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411 Magnetic Tape Unit and Control. Refer to M3411 pages for ordering information, #7003 is prerequisite for attachment.
- **Buffers:** Transfer data between the input and output devices and the communication line. SDLC communications uses a customer defined Request/Response Unit (RU) of up to 512 bytes. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. The buffers also transfer data between input and output devices during local operation.
- **Printer Format Controls:** Facilitate the formatting of printed data. Vertical and horizontal control characters in data initiate vertical or horizontal tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.
- **Compression/Expansion:** Implementation provides a compression option at the terminal for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequences to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received. The option, when exercised, is unique to the individual associated session and output device.
- **Decompression:** Provides the decompression function associated with the receipt of a compacted data stream whereby a pair of consecutive alphanumeric characters is represented by a single transmission byte. Function is dependent upon transmission by the host of a decompression table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompression occurs for data directed to the printer, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided. The function is an option exercised and performed by the 3777 terminal and may be unique to each associated session and output device.
- **Automatic Card Reading:** Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

- **Job Control:** Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

Local utility jobs may be defined by the operator and stored in terminal storage to provide the following functions:

#### Input

Card

Magnetic Tape

Diskette

#### Output

Printer, Magnetic Tape,  
Diskette, Card Punch

Printer, Diskette, Card  
Punch

Printer, Magnetic Tape,  
Diskette, Card Punch

- **Record Formats:** Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape data sets, are also applicable to diskette as a function of Basic Exchange data sets (128 byte maximum).

Basic Exchange diskettes may be read by the terminal. Basic exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control. Input record size from both magnetic tape and diskette may be limited to 80 or 128 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

- **Remote Power Off:** This feature can be used to conserve energy used by the terminal by providing the capability for the host CPU application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. The terminal must also be equipped with the appropriate communication special features. This capability is in addition to the standard power down switch which can be manually operated. The 3262 Line Printer requires manual powering down.
- **Encrypt/Decrypt Feature:** Available to provide secure data transmission in conjunction with ACF VTAM Encrypt/Decrypt Feature 5735-RC2, feature #6010 and Programmed Cryptographic Facility Program Product 5740-XY5.

**Performance Considerations:** The line-to-printer performance of the 3777 mdl 3 and attached 3203 mdl 3 is up to 1,000 lpm (up to 1,200 lpm with 3203 mdl 3 Speed Enhancement feature #6360) on the 3203 mdl 3 and Print Speed Enhancement (#5595) on the 3777 mdl 3 with 48-character AN or HN set, and up to 870 lpm (up to 1,020 lpm with 3203 mdl 3 Speed Enhancement feature) with a 60-character PN set. For other speeds, see the "3770 Data Communication System", GA27-3097.

The 3777 mdl 3 MLU terminal will operate, however, with concurrent input-output processing in either a Duplex or Half-Duplex data communications mode as a function of the Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations.

The degree of degradation which may occur will tend to be greater when Half-Duplex communications are employed as opposed to

Duplex communications and System facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression characteristics, characters read/printed, forms skipping, application processing, SNA pacing, and cryptographic processing, must all be considered in determining actual throughput. See "3776 and 3777 Component Description Manual", GA27-3145, for additional information.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half-Duplex communications mode. The 3777 mdl 3 operating Duplex (Canada only > 19.2K <) (Except Canada > 20.4K <) bps on a terrestrial link may however present a variance of from greater to degraded overall terminal throughput when compared to comparable operation in Half-Duplex mode. Reference the "Component Description Manual for the IBM 3776/3777 Communication Terminals", GA27-3145, for specific performance considerations.

**Problem Determination Procedures:** Function has been designed into this unit to help provide availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See "IBM 3770 Multiple Logical Unit Operator's Guide for the 3776-3, 3776-4, 3777-3", GA27-3165.

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700, 3203 and 3262 pages.

**Communications:** See "Special Features". Transmission speeds from 2400 bps to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps. Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 4800 bps are nonswitched facilities. Direct Local Attachment to 3705-II at 14.4K bps or a 3725 at 19.2K bps. EBCDIC is the standard transmission code. (Canada only > ASCII is available as a special feature on the 3777 and by RPQ on the 3262.) Refer to M2700 pages for information on customer responsibilities, communication facilities and other attachment information.

(Canada only > For 19.2K bps, the 3777 mdl 3 may use either the EIA Interface (#3701) or the High-Speed Digital Interface (#4501) to communicate through an appropriate modem and communication facility with a 3704/3705 Communication Controller Line Set Type 1G (#4717) at the central processing unit. This type of communication requires modems which are line compatible (suitable for interconnection and which provide optional EIA RS-232-C or High-Speed Digital Interface DTE interfaces. Also attaches via a Communications Adapter feature (#1601) on the 4331 Processor. The 4331 must be equipped with a Local Attachment Interface (#4801) and its prerequisites see "Special Features" in M4331 pages.)

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

**Note:** 4-Wire Switched Network Backup is available on 3863 mdl 1, 3864 mdl 1 or 3865 mdls 1 or 2. For communications capability, product utilization and features, see M3863, 3864 and 3865 pages.

**Communications Adapter:** An integrated communications adapter without business machine clocking is standard. It provides SDLC communications over switched or nonswitched facilities.

**Publications:** GC20-0001

### SPECIFY

- (Canada only > Voltage (115V AC, 1-phase, 3-wire, 60 Hz): #9880 for locking plug, or #9881 for non-locking plug. See M3203, 3262 and 3411 for their power requirements. <)
- Power (AC, 1-phase): One must be specified.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	220V #2803
220V #2813	
235V #2814	

See M3203-3 for 3-phase power requirements.

See M3411 for Magnetic Tape Unit power requirements.

- Power Cords: One must be specified.

50 Hz cord without plug #2760  
60 Hz cord without plug #2762

- Color Group: Blue is supplied as standard (no specify required).
- Language Group: One must be specified.

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931

**Note:** Not recommended for field installation.

- Keyboard Arrangement: One must be specified.

Belgian #2971	Italian #2968
Brazilian #2975	Japanese #2955
English UK #2958	Japan Katakana #2973
French #2970	Spanish #2960
German #2957	Span Speak #2969
Int'l #2950	

**Note:** Not recommended for field installation.

- Cables: Fixed-length cables except for the 3602 and the 3411 Magnetic Tape are supplied as standard. Refer to "Installation Manual-Physical Planning", GA27-3006. 3411 cables must be separately ordered.
- (Canada only > EIA RS-232-C 19.2K bps Line Speed: #9481 provides support of 19.2K bps. Provides diagnostics and used for record purposes. <)
- (Canada only > Alternate Address: #9011 for record purposes only. Order this optional feature to specify that diskettes containing terminal control code updates are to be mailed to an alternate address supplied by CE using a Teleprocessing Control number (TPC). The alternate address selected is usually the central site location. <)

### SPECIAL FEATURES

(Canada only > ASCII Feature (#1201): A 48-data key keyboard (produces 94 ASCII graphics) is provided in place of the standard EBCDIC keyboard. This feature also provides for operation with diskette storage features (ASCII is written on the diskette). Orders for #1201 must also specify one print belt, #9493 for 48-character ASCII, #9494 for 64-character ASCII, or #9495 for 94-character ASCII. Maximum: One. Field Installation: Not recommended. Note: ASCII on the 3262 requires an RPQ see M3262 pages. <)

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One. Field Installation: Yes.

**CCITT-V.35 Interface (#2911):** Provides a cable and interface compatible with CCITT-V.35 recommendations for attachment of Data Communication Equipment (see M2700 pages). Speed of 20.4K bps is permitted. Required for direct High Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150m (491 ft). Limitations: Cannot be installed with #3701, #4501 or #5655.

Field Installation: Yes.

**Door Keylock (#3401):** Provides one keylock and two keys for the desk-console cabinet door. Limitation: The keys provided for this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. Maximum: One. Field Installation: Yes.

**Door Keylock, Dual (#3402):** Provides two keylocks and four identical keys for both desk-console cabinet doors. Limitation: The keys provided with this lock can be duplicated by local keymakers. Additional or replacement keys are not available from IBM. Maximum: One. Field Installation: Yes. Prerequisites: #4902.

**Encrypt/Decrypt (#3680):** Provides cryptographic data transmission in conjunction with program support in the host. Includes a security keylock. Each machine will have its own unique key. Two identical keys are supplied with the feature. Maximum: One. Field Installation: Yes. Note: A mercury battery, P/N 1743456 or equivalent, is required. A battery is shipped with this feature. See "Accessories" for additional or replacement battery. Replacement of the discharged battery is the customer's responsibility.

**(Canada only) EIA Interface (#3701):** Provides an EIA RS-232-C compatible interface and a cable for attachment to a modem. Speeds from 2400 bps to 9600 bps and at 19.2K bps are permitted. Limitations: Cannot be installed with High-Speed Digital Interface (#4501), DDS Adapter, Point-to-Point (#5650), DDS Adapter, Multi-point (#5651) or V.35 Interface (#4720). Maximum: One. Prerequisites: For 19.2K bps operation, #9481 is required see item under "Specify".<)

**(Except Canada) CCITT-V.24/28 Interface (#3701):** Provides a cable and interface compatible with CCITT-V.24/28 recommendations for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, ABC V.28, ISO Standard 2110 and other relevant CCITT Recommendations (refer to M2700 pages). Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds from 2400 bps to 9600 bps are permitted.<.) (Japan only) Specify: #2946 for NTPC Self-Test for use with DCE that is attached under the provision of the IBM Multiple Supplier Systems Policy.<.) (Except Canada) Limitations: Cannot be installed with #4501 or #2911.<.) (Except Canada) Limitations: Cannot be installed with #4501, #2911 or #5655.<.)

(Except Canada) Maximum: One. Field Installation: Yes.<.)

**High-Speed Digital Interface (#4501):** Provides a cable and interface for attachment to a modem which permits point-to-point synchronous operation at (Canada only) 19.2K bps on a Type 5703 or 8803 wideband<.) (Except Canada) 20.4K bps on a broadband<.) channel. Limitations: Cannot be installed with (Canada only) EIA Interface (#3701), V.35 Interface (#4720)<.) CCITT V.24/28 Interface (#3701) or CCITT V.35 Interface (#2911) or X.21 Adapter for Non-switched Networks (#5655). Maximum: One. Field Installation: Yes.

**Keylock (#4650):** Provides a mechanical keylock to activate controls that disable all operator activity related to keyboard or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to "Accessories" for information on additional or replacement keys. Maximum: One. Field Installation: Yes.

**Diskette Storage, 1st (#4901):** This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: One movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1898 128-byte records. Data may be stored in either a Basic Exchange data set or in a 3770 format dataset. Diskette capabilities allow for:

- Concatenate (pool) - the ability to concatenate on a data set basis.
- Multi-Volume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive.

Maximum: One. Field Installation: Yes.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Copy - Data can be copied from diskette 1 to diskette 2. Maximum: One. Field Installation: Yes. Prerequisites: #4901.

**Operator Identification Reader (#5450):** Reads 40 characters (of which 37 are discretionary) from magnetic-stripe cards which are encoded in the ABA format. Each character contains four bits plus odd parity. Card size is 3-3/8 inches by 2-1/8 inches ranging from 0.007 inches to 0.045 inches thick may be read. Data read from the magnetic stripe card cannot be printed or displayed. Limitations: The operator must position and slide the card through the reader-slot at a steady rate of between 5 and 40 inches per second for a read operation. Maximum: One. Field Installation: Yes.

**Print Speed Enhancement (#5595):** Provides support for 3203 Printer mdl 3 operating with 1,200 lpm Speed Enhancement feature (#6360). Maximum: One. Field Installation: Yes.

**(Japan only) X.21 Adapter For Nonswitched Networks (#5655):** X.21 adapter for Nonswitched Networks (#5655) provides a cable and interface meeting CCITT-X.21 characteristics for attachment of data communication equipment. Feature operates only over non-switched lines using SDLC procedures. Speeds of 2400, 4800 or 9600 bps are permitted. Limitations: Not with #3701, #2911 or #4501 DDC Nonswitched Network only. Maximum: One. Specify: Record purposes only. #9822 for 2400 bps, #9823 for 4800 bps, or #9825 for 9600 bps.<.)

**3411-1 Magnetic Tape Unit And Control Attachment (#7801):** To attach one 3411-1 Magnetic Tape Unit and Control. Maximum: One. Prerequisites: #7003 on 3411 mdl 1. Field Installation: Yes.

**2502 Card Reader Attachment (#8002):** Provides for attachment of a 2502 Card Reader mdl A1, A2 or A3. Limitations: OMR is not supported. Maximum: One. Field Installation: Yes.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit mdl 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. Limitations: The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One. Field Installation: Yes.

## ACCESSORIES

(Except Canada) Accessories are available on a "purchase-only" basis. For shipment with machine, order P/N indicated below.

**Mercury Battery (P/N 1743456):** Provides power to sustain the master key of the Encrypt/Decrypt feature (#3680) when normal power is not present. This accessory is a 4-volt non-rechargeable mercury battery. This battery has a shelf life of one year under normal conditions and can be expected to provide 3.5 years of normal operation. Note: Discharged battery should be returned to IBM.<.)

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be

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**MACHINES**

**M 3777.13**  
**FEB 87**

obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order.

**SUPPLIES**

For 3203 mdl 3 ribbons, contact IBM.

## 3777 COMMUNICATION TERMINAL MODEL 4

### PURPOSE

The 3777 mdl 4 is a high-speed remote job entry terminal providing an SNA Multiple Logical Unit (MLU). A keyboard and console display are used for terminal control and for operator communication with the host processor. Terminal operation may be controlled by the storage of operating procedures, terminal setups and local utility programs in terminal storage for use by the terminal operator. The 3777 is not designed as an interactive terminal. The printer is not integrated into the 3777 mdl 4 but is a stand-alone IBM 3262 mdl 2 or 12 Printer which is cable attached to the 3777 mdl 4. Special features permit one or two diskette storage devices, one magnetic tape unit, one card reader, one card punch and an additional printer. One of three card readers can be selected for operation at speeds of 150, 300 or 400 cards per minute. The card punch operated at 50 cpm. A minimum configuration includes a 3777 mdl 4 Communication Terminal and a 3262 mdl 2 or 12 Printer.

### MODEL 4

#### 3262 Nominal Rated Speed (LPM)

Character Set	Mdl 2	Mdl 12
48 Character (AN)	650	325
64 Character	467	230
96 Character	364	180
63 Optimized	625 (max)	310 (max)

**Limitations:** The input/output capabilities outlines under "Highlights" are dependent upon appropriate configurations of the terminal. Keyboard, console display and terminal storage are standard. The 3262 Printer is a standalone unit. A minimum configuration includes a 3777 mdl 4 Communication Terminal with the appropriate communications capabilities and a 3262 Printer. For other configurations refer to "Special Features" below. The duplex data communications capability of the 3777 mdl 4 is operational on nonswitched full duplex communications facilities only.

**Prerequisites:** For SDLC Communications With S/370 or a 4300 Processor: A 3704, 3705 or 3725 Communications Controller operating under Network Control Program (NCP/VS) and attached to any virtual storage S/370 Processor or 4300 Processor operating under VS1, MVS or DOS/VS using RES, JES2, JES3, Power/VS and VTAM.

**Note:** 4300 MVS and JES2-3 support is limited to 4341, 4361 or 4381 Processors.

An appropriately featured 3705 operating under the appropriate level of Network Control Program (ACF/NCP/VS) is required for Duplex data stream operation.

### HIGHLIGHTS

- **Communications:** Transmission speeds from 2400 bps to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) bps are provided via an integrated communications adapter using the appropriate modems and communications facilities. Duplex - simultaneous inbound/outbound -- data transmission is provided on nonswitched full duplex communication facilities only when communicating with an appropriately equipped 3705 or 3725 Communication Controller with the supporting ACF/NCP/VS level.
- **Keyboard:** EBCDIC arrangement with 47 data keys for all countries. The keyboard in conjunction with a standard console display, indicator lights, function keys, operating mode switches and a 3-position numeric display provides operator control. Host application commands, System Services Control Point (SSCP) commands and local functions are entered from the keyboard. Data entered on the keyboard is displayed. If a keying error is made, Character Backspace and Character

Advance may be used for editing. Character Backspace and Character Advance are non destructive. Character Advance is typamatic. Reset returns to the position from which the Character Backspace began.

- **Console Display:** Contains 16 lines of 64 characters each for a total of 1024 characters. The 3777 mdl 4 reserves the bottom three lines of the display for operator keying, display of system information and prompting for information required for the execution of functions. The remaining 13 lines of the display are used to display messages between the terminal and the host application or the SSCP and to display information regarding terminal operations such as host input.

Lower case alphabetic are converted to upper case before displaying. When the cursor is beneath a character, any new data keystroke will cause the new character to replace the old. Overstrikes are not permitted.

Each message is displayed as it is received except as described below. Each message is also written in terminal storage. At power on time the operator is prompted to specify date and time. As messages are received they are time-stamped prior to display and storage. Messages longer than a display line will wrap around to the next line with an indent to aid readability. The display fills from top to bottom. Subsequent new message lines replace the oldest message lines. The most recent message received is identified by the Greater Than sign in the first position. The following line is blanked to assist the operator with message identification.

Function keys on the keyboard allow the operator to control the display function. The display can be held while incoming messages are sent to terminal storage and not displayed. If messages arrive during the 'hold' state a message alert light notifies the operator. The operator may subsequently display the desired message group. A terminal utility program is available for listing or copying the message contents of terminal storage for external message retention and reference.

- **Printer:** The 3262 is a standalone unit providing 132 print positions. Horizontal spacing is 10 characters per inch (25.4 mm). Vertical spacing is limited to 6 or 8 lines per inch (25.4 mm). Forms skipping and spacing are program controlled within the 3262, and is optimized by the 3777 to provide the closest comparison possible with the other 3776/3777 MLU models and their associated programming interfaces.

There are character set variations forms control variations between the 3262 and the other printers associated with the IBM 3776/3777. The user should refer to the "3776/3777 Component Description Manual" (GA27-3145) and the "Forms Design Reference Guide for Printers" (GA24-3488) for the specific variations. Refer to M3262 for ordering information.

- **Second Printer Attachment:** Adding a second printer to the 3777 mdl 4 will yield a higher output to the 3777. As an example:

3262 Mdl 2	Second Printer		48 Character Nominal Rated (LPM)
	3262 Mdl 2	3262 Mdl 12	
650			650
650		325	975
650	650		1300

- **Terminal Storage:** Is standard for message spooling, terminal control, utility programs and user generated procedures.
- **Diskette Storage:** There are two diskette storage devices available as special features. While the devices are physically identical to those on the 3777 mdl 1, additional operational facilities such as data set concatenation enhance the use of the special feature diskette storage devices. Also, each special feature diskette storage device may be assigned indi-

vidually to an independent host SNA session or used logically for input or output. Diskette operation is concurrent with other terminal functions.

- **Magnetic Tape:** May be used as either an input or as an output device. One 3411 Magnetic Tape Unit and Control attachment is available as a special feature. The 3411 mdl 1 provides 9-track tape with recording densities of 1600 bpi Phase Encoded or 800 bpi NRZI. Seven track tape operation is not provided. The 3411 mdl 1 may be assigned to an independent host SNA session or used locally for input or output. Labeled and unlabeled tapes are supported. Records are fixed or variable length and may be unblocked or blocked to a maximum block size of 4,000 bytes. Maximum record size is 255 bytes. A block size of up to 2,000 bytes automatically provides dual buffering. Magnetic tape operation is concurrent with other terminal functions. Refer to G232-0004 for detailed information on operation of the 3411 Magnetic Tape Unit and Control. Refer to M3411 for ordering information, #7003 is prerequisite on 3411 mdl 1 for attachment to 3777.
- **Buffers:** Transfer data between the input and output devices and the communication line. SDLC communications uses a customer defined Request/Response Unit (RU) of 256 or 512 byte buffers. The actual transmission is dependent on session pacing values, data length, buffer availability and data availability. The buffers are used for transferring data between input and output devices during local operation.
- **Printer Format Controls:** Printer Format Controls Facilitate the formatting of printed data. Vertical control characters in data initiate vertical tabbing. Carriage control definition provides for specification of a variable number of line numbers per carriage stop with a maximum of 60 lines per carriage control definition. Carriage control definition may be defined at the terminal or may be sent dynamically by the host application. Extended Forms Definition is standard and utilizes terminal storage.
- **Compression/Expansion:** Implementation in the 3777 mdl 4 by providing a terminal option for a job that reads data from cards, magnetic tape, or diskette to the line. An identifying sequence is substituted for each occurrence of two or more consecutive duplicate characters. Trailing blank truncation is standard. The terminal automatically expands the compression sequences to the correct number of blanks or duplicate characters for compressed transparent or non-transparent data received. The option, when exercised, is unique to the individual associated session and output device.
- **Decompression:** Provides the decompression function associated with the receipt of a compacted data stream whereby a pair of consecutive alphanumeric characters is represented by a single transmission byte. Function is dependent upon transmission by the host of a decompression table corresponding to the compaction table used by host programming in creating the compacted job data stream. Decompression occurs for data directed the printers, card punch, magnetic tape and diskette (except 3770 format). Compaction by the terminal of data inbound to the host is not provided. The function is an option exercised and performed by the 3777 terminal and may be unique to each associated session and output device.

Automatic Card Reading Capability is under the control of the operator. The "hot reader" function may be enabled/disabled at any appropriate operational time.

- **Job Control:** Initiated by the operator, pertains to online jobs with the host and local utility jobs run concurrently with the online jobs. Online job submission may be initiated at any time there is an SNA session available for data transmission. The terminal may have up to six concurrent sessions that are controlled by the operator. Online job input may consist of card, diskette, or magnetic tape data. Data from different devices or data sets may be concatenated into a single input data stream as one job execution. Online job output may consist of printer, card, diskette or magnetic tape data.

- **Local Utility:** Jobs may be defined by the operator and stored in terminal storage to provide the following functions:

Input	Output
Card	Printers, Magnetic Tape, Diskette, Card Punch
Magnetic Tape	Printers, Diskette, Card Punch
Diskette(s)	Printers, Magnetic Tape, Diskette, Card Punch

- **Record Formats:** Consist of card image, print image and 3770 format. Card image and print image, in addition to being applicable to card reader, card punch, printer and magnetic tape datasets, are also applicable to diskette as a function of Basic Exchange datasets (128 byte maximum). Basic Exchange diskettes may be read by the terminal. Basic exchange diskettes may also be written by the terminal, thereby creating a diskette for further Basic Exchange mode processing.

3770 format is applicable to diskette data recording which is to be subsequently printed or punched. 3770 format recording results in more efficient diskette utilization than does card or print image. Basic Exchange (card or print image) or 3770 format is a user specification in job control.

Input record size from both magnetic tape and diskette may be limited to 80 or 128 bytes, because of host programming considerations. In addition, the ability to concatenate multiple data sets, with different record lengths, into a single input job stream requires host programming support of a CDS-FM Header type 1 (Continue Destination Select).

- **Remote Power Off:** This function can be used to conserve energy via the capability of the user written host CPU application program to initiate power down at the terminal by sending a controlled data sequence over communication facilities. This capability is in addition to the standard power down switch which can be manually operated. Note: The 3262 Line Printer requires manual powering down.
- **Performance Considerations:** The line to printer performance of the 3777 mdl 4 and attached 3262 mdl 2 is up to 650 lpm with 48 character set. For other speeds see M3262.

The 3777 mdl 4 MLU terminal will operate, however, with concurrent input-output processing in either a Duplex of Half Duplex data communications mode as a function of the Multiple Logical Unit capability. The card reader, punch, diskette storage devices, magnetic tape unit and display console may have a degrading effect on printer performance during concurrent operations.

The degree of degradation which may occur will tend to be greater when Half Duplex communications are employed as opposed to Duplex communications and System facilities in support of the concurrent inbound-outbound data stream capability of the terminal.

In general, Duplex data communications operation will tend to provide greater terminal throughput under concurrent input/output functions than a Half Duplex communications mode. The 3777 mdl 4 operating Duplex (Canada only > 19.2K <) (Except Canada > 20.4K <) bps on a terrestrial link may, however, present a variance of from to greater degraded overall terminal throughput when compared to comparable operation in Half Duplex mode. Reference the "Component Description Manual for the IBM 3776/3777 Communication Terminals", (GA27-3145), for specific performance considerations.

Actual terminal device throughput is dependent upon operational and systems programming characteristics. Factors such as the communication facilities, transmission block lengths, compression/compaction characteristics, characters read/printed, forms skipping, application processing, and SNA pacing, must all be considered in determining actual through-

put. See "IBM Component Description 3776 and 3777 Manual", GA27-3145, for additional information.

**(Except Japan > Problem Determination Procedures:** Significant function has been designed into this unit to help provide greater availability to the customer. This has been done through the use of problem identification routines and procedures that are easily understood and used by the operator. See "IBM 3777 Model 4, Communications Terminal Operator's Guide", (GA27-3309).<)

**Customer Responsibilities:** It will be a customer's responsibility to use and follow the Problem Determination Procedures and fill out the trouble report prior to calling IBM for service. Also refer to M2700 and M3262 pages. The 3262 is designated as Customer Setup Unit (CSU).

**Communications:** See Special Features. Transmission speeds from 2400 bps to 9600 bps and at (Canada only > 19.2K <) (Except Canada > 20.4K <) Point-to-point and multipoint transmission capability over switched or nonswitched facilities is allowed by selecting the appropriate modem and communication facility. Speeds above 9600 bps are nonswitched facilities. Refer to M2700 pages for information on customer responsibilities, communication facilities, and other attachment information.

IBM Modems	Speed (bps)
3863	2400
3868 mdl 1	2400
3864	4800
3868 mdl 2	4800
3865	9600
3868 mdl 3,4	9600

**Note:** 4 Wire Switched Network Backup is available on 3863, 3864 and 3865. For Communications capability, product utilization and features, see M3863, M3864 and M3865 pages.

**Publications:** GC 20-0001

## SPECIFY

- Power (AC, 1-phase): One must be specified.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	220V #2803
220V #2813	
235V #2814	

See M3262 for power requirements.

See M3411 for Magnetic Tape Unit power requirements.

- Power Cords: One must be specified.

50 Hz cord without plug - #2760  
60 Hz cord without plug - #2762

- Color Group: Blue is supplied as standard (do not specify).
- Language Group: One must be specified.

English #2927	Italian #2932
French #2928	Spanish #2931
German #2929	

**Note:** Not recommended for field installation.

- Keyboard Arrangement: One must be specified.

Aust./German #2957	Italian #2968
Belgian #2971	Norwegian #2966
Brazilian #2975	Portuguese #2959

Danish	#2965	Spanish	#2960
English UK	#2958	Span Speak	#2969
Finnish	#2963	Swedish	#2967
French	#2970		
International	#2950		

**Note:** Not recommended for field installation.

- Cabling: All cables are supplied with fixed lengths with 3777 shipment except the 3411 Magnetic Tape and the 3262 Printer. Refer to "Installation Manual-Physical Planning", GA27-3006. 3411 cables must be separately ordered (see M3411). The 3262 provides a 1.8m (6 ft) standard or 4.3m (14 ft) optionally specified Signal Cable (#9405) which connects to the 3777 mdl 4. The 3262 Customer Set-Up (CSU) must be performed prior to installation of the 3777 mdl 4.
- (Canada only > EIA RS-232-C 19.2K bps Line Speed: #9481 provides support of 19.2K bps. <)

## SPECIAL FEATURES

**Audible Alarm (#1390):** Sounds an alarm that alerts the operator of conditions requiring manual intervention. The alarm can be enabled and reset from the keyboard. Maximum: One. Field Installation: Yes.

**CCITT-V35 Interface (#2911):** Provides a cable and interface compatible with CCITT-V35 recommendations for attachment of Data Communication Equipment (see M2700 pages). Speed of 20.4K bps is permitted. Required for direct High Speed Local Attachment to 3705-II at 14.4K bps with maximum cable distance of 170 feet or a 3725 at 19.2K bps with a maximum cable distance of 150m (491 ft). Limitations: Cannot be installed with #3701 or #5655.

Maximum: One. Field Installation: Yes.

**CCITT-V24/28 Interface (#3701):** Provides a cable and interface compatible with CCITT-V24/28 recommendations for attachment of an external IBM modem or PTT mandatory modem complying with CCITT Recommendations (1976) V.24, V.28, ISO Standard 2110 and other relevant CCITT Recommendations (refer to M2700 pages). Other external non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Speeds from 2400 bps to 9600 bps are permitted. Limitations: Cannot be installed with #2911 or #5655.

Maximum: One. Field Installation: Yes.

**Keylock (#4850):** Provides a mechanical keylock to activate controls that disable all operations related to keyboard or control of data at the terminal. Each machine will have its own unique key. Two identical keys are supplied with the feature. Refer to "Accessories" for information on additional or replacement keys. Maximum: One. Field Installation: Yes.

**Diskette Storage, 1st (#4901):** This storage device, with a customer-removable diskette, is placed in the left cabinet. Additional diskettes are available from IBM. Contact IBM. Characteristics of the diskette storage device are: One movable read/write head; one read/write surface; 73 data tracks; 26 sectors per track and 128 bytes per sector. Up to 1,898 128-byte records. Data may be stored in either a Basic Exchange dataset or in a 3770 format dataset. Diskette capabilities allow for:

- Concatenate - the ability to concatenate on a data set basis.
- Multi-Volume - allows a read or write operation to automatically continue to diskette 2 if it has been placed in ready condition or it may continue on the current drive.

Maximum: One. Field Installation: Yes.

**Diskette Storage, 2nd (#4902):** Provides a second diskette storage device with the same characteristics as the first. It is placed in the right desk cabinet which is also supplied by this feature. The second diskette allows additional capabilities for: Data can be copied from diskette 1 to diskette 2 or vice-versa. Maximum: One. Field Installation: Yes. Prerequisites: Diskette Storage, 1st (#4901).

**Second Printer Attachment (#6302):** Supports the attachment of a second 3262 Printer. Either a Mdl 2 or a Mdl 12 may be attached. Maximum: One.

**3411-1 Magnetic Tape Unit And Control Attachment (#7801):** To attach one 3411-1 Magnetic Tape Unit and Control. Maximum: One. Field Installation: Yes.

**2502 Card Reader Attachment (#8002):** Provides for attachment of a 2502 Card Reader Model A1, A2 or A3. Limitations: OMR is not supported. Maximum: One. Field Installation: Yes.

**3782/3521 Card Punch Attachment (#8150):** To attach a 3782 Card Attachment Unit Model 1 and a 3521 Card Punch. The 3521 can be equipped with special features for Card Read/Punch Check and/or Card Print. Limitations: The Card Read/Punch Check special feature on the 3521 is limited to the punch checking function only. Maximum: One. Field Installation: Yes.

**MODEL CONVERSIONS**

Field conversion is possible from mdl 3 to mdl 4.

**ACCESSORIES**

**Locks and Keys:** The Keylock (#4650) special feature is shipped with two identical keys. Additional or replacement keys may be obtained only from IBM (purchase only). A customer letter of authorization with key identification number must accompany each order.

**SUPPLIES**

For 3262 Belts and Ribbons, see M3262 pages. For 3203 mdl 3 ribbons, contact IBM.

## 3780 DATA COMMUNICATIONS TERMINAL

[NO LONGER AVAILABLE]

### PURPOSE

A data transmission terminal using the BSC technique. It can communicate over appropriate communications facilities to another 3780, a S/360 models 22 through 195, any S/370 processor, any 30XX processor, or a 2780 Data Transmission Terminal. May be locally attached to a 3704/3705 Communications Controller. Communication is also possible with the 4300 processors via channel attached 2701, 3704, 3705 or via a Communications Adapter on the 4331 or 4361. For requirements, see "Prerequisites".

### MODELS

**Model 1 001**

#### Prerequisites:

S/360 mdl 25 ... communications can be via the Integrated Communications Attachment (#4580) with appropriate binary synchronous features on the 2025, or via a 2701 Data Adapter Unit or 2703 Transmission Control ... see below.

S/360 mdls 22 through 195 (except mdl 44 or 67 in TSS mode), any S/370 processor, or any 30XX processor... communications can be via a 2701 Data Adapter Unit or 2703 Transmission Control equipped with appropriate binary synchronous features ... see M2701, 2703 pages.

**Notes:** [1] To utilize OLT support, the host processor requires a minimum of 32K bytes of storage ... [2] The 3780 communicates only in EBCDIC or ASCII codes ... [3] Only EBCDIC Transparency (#3601) is available on the 3780. Therefore, a 2701 or 2703 must be configured with 3780 restrictions and limitations for compatibility ... [4] All 3780s on a multipoint line must have the same code, EBCDIC or ASCII.

S/360 (except mdls 22, 25, 44, 67 in TSS mode, or 85), any S/370 processor, or any 30XX processor ... communications can be via a 3704/3705 Communications Controller. **Note:** See the 3704 and 3705 Machines and Programming pages for attachment capability and refer to Host System Programming pages for possible restrictions to any of the above attachments.

S/370 mdls 115, 125, 135, 135-3, 138 ... communications can be via the Integrated Communications Adapter (#4640) and appropriate binary synchronous features on the 3115, 3125, 3135, 3135-3, 3138 as well as via a 2701, 2703 or 3704/3705. Communication is also possible with the 4300 processors via channel attached 2701, 3704 or 3705; or via a Communications Adapter on the 4331 and 4361 processor.

3704/3705 Medium Speed Local Attachment ... attachment without modem at speeds up to 2400 bps via IBM-provided cables. Requires #7705 ... see "Specify".

Another 3780 ... communications require (#9711) and the same (#9761 or #9762) on both units ... see "Specify".

2780 Data Transmission Terminal ... [mdls 1, 2, 4] communications require that both terminals have #9761 on 3780, #9762 on 2780 and #3601 on 3780, #8030 on 2780. Communications can be in EBCDIC Transparency mode only. The 3780 may not have multiple records in Transparent mode.

### HIGHLIGHTS

Provides medium-speed, batch-oriented, buffered card reading and printing via appropriate communications facilities ... see "Communications Facilities". Punched card output is provided via attachment of a 3781 Card Punch ... see M3781 pages.

**Card Reader:** Reads at a rated speed of 600 cards/minute. Provides hopper capacity of 1200 cards and stacker capacity of 1300 cards. Only 80-column cards can be read.

**Printing:** Prints at a rated speed of 350 lines/minute utilizing the basic 52-character set. Interchangeable type bars of 39- and 63-character sets are available with rated speeds of 425 lpm and 300 lpm, respectively. Only the 63-character set may be employed when using ASCII transmission code. The printer provides 120 print positions standard with feature expansion to 144 positions ... see "Special Features". Horizontal and vertical format control are provided as standard functions of the printer.

**Buffers:** Provides two 512-character buffers which service the transmission line and the I/O units alternately to provide overlap operation for efficiency.

**Buffer Checking:** All characters are checked on the data path when sent to or received from the buffer.

**Variable Record Length:** End-to-end characters are used to define the end of a record, allowing for complete variable length. Full buffer-blocks with variable-length records can be transmitted or received. On card transmission, blank positions are removed from the end of the card record to increase the transmission efficiency.

**Space Compression/Expansion:** Operable under switch control, this capability provides for the removal of consecutive spaces in transmitted data and their re-insertion in received data. A 2-character sequence is substituted for from two to 63 consecutive spaces. If more than 63 consecutive spaces are to be transmitted, a second 2-character sequence will be substituted for the number of consecutive spaces greater than 63. If only one space is to be transmitted, it will be transmitted as a normal space. This feature is inoperable when transmitting in transparency mode or operating in home mode.

**Home Mode:** Provides card reader-to-buffer-to-printer operation in an offline non-communications mode.

**Integrated 2400/1200 bps Modem:** Provides 2400 bps transmission with half-speed backup on leased voice grade facilities ... compatible with 3872 modem.

**Conversation Mode:** Allows a CPU to turn the communications line around after receiving text and return text without additional selection.

**Audible Alarm:** Alerts the operator when manual intervention is required in line mode ... unattended operation is not provided.

**Speed Select Switch:** A switch allowing the control of switched network operation at either 600 or 1200 bps.

**Communications Facilities:** The 3780 operates in half-duplex mode over the types of facilities listed below ... for information concerning these facilities, see M2700 pages.

- PTT Public Switched Telephone Networks
- PTT Nonswitched Voice Grade lines
- PTT Public Switched Data Networks
- Privately owned communication facilities
- PTT Public Nonswitched Data Networks

**Notes:** When operating at 2400 bps on PTT-supplied switched or nonswitched facilities, there may be additional restrictions and limitations to the facility and the operation. For details, see *Bisynchronous General Information Manual* (GA27-3004). When operating at speeds above 2400 bps to 7200 bps, the facility requirements may vary by data set (modem) type. The data set (modem) manufacturer should provide this information to the customer at his request.

**Binary Synchronous Transmission:** Allows for transmission rates of 1200, 2000, 2400, 4800, 7200/3600 bps ... see "Modems" below and "Data Set Attachment" under "Specify". Communications can be with another 3780, a 2780 mdl 1, 2 or 4, a S/360 mdls 22 through 195 (except mdl 44 or mdl 67 in TSS mode), or any S/370 Processor. Communication is also possible with the 4300 processors via channel attached 2701, 3704 or 3705; or via a Communications Adapter on the 4331. For requirements, see "Prerequisites". In addition, the 3780 may be multiplexed on the same line facility with other BSC devices (1826, 2715, 2780, 3271, 3275, 3735) as tributary stations on a multipoint line with a S/360 mdls 22-195 (except mdl 44 or mdl 67 in TSS mode), any 4300 processor or any S/370 processor as the control station. In a switched control network, it may use the same termination (phone number) at the computer that is used for the other BSC devices.

**Transmission Code:** One of two codes can be selected ... see "Specify". For printable graphics, see "Type Catalog" pages.

**EBCDIC Code:** 256-character set, which is the basic code of S/360 and S/370.

**ASCII Code:** Industry standard code with a 128-character set.

**Transmission Checking:** A redundancy check is performed on all data. EBCDIC uses a 16-bit cyclic check transmitted as two 8-bit bytes ... ASCII uses an odd-parity VRC on each character, including the LRC character and an LRC check transmitted as a single 8-bit odd parity byte. Format check plus an odd/even block check is provided on both code sets.

**Modems:** One Integrated 2400/1200 bps modem feature, 3863 (2400 bps) modem, 3864 (4800 bps) modem, 3872 modem (2400/1200), can be attached to the 3780. For communications capabilities, product utilization, and special features, see M2700, 3863, 3864, 3872 pages and "Integrated Modem" under "Special Features" below.

**3780 Data Communications Terminal (cont'd)**

**Card Limitations:** Generally, scored cards require careful handling and a favorable environment. Use of the following scores has been approved:

**Internal Scores** (before separation): M-4, M-5, OM-2, OM-3, S-1 and ID-3. Two sizes only, 2 x 3-1/4 inches or 2-3/16 x 3-3/4 inches. **Note:** When using OM-2 or OM-3, reading must be terminated prior to the scored column.

**External Scores** (after separation): M-3, M-4, M-5, M-6, M-7, M-11, OM-2, CF-4 and CF-11. OM-3 may be used if the score is on the column 1 end. **Note:** Upper left corner cut required when the M-11 or CF-11 is used on the column 1 end.

All other scores may result in unsatisfactory performance. For possible use of Port-A-Punch® or Micro-Processing cards, consult IBM. Aqua cards and C-4 corner cut cards cannot be used.

**Customer Responsibilities:** See M2700 pages. In addition, the customer must be advised that when non-IBM data sets or privately owned communications facilities are used, he is responsible for ensuring that signal levels and impedances are compatible with the IBM communications interface.

**Publications:** GA24-3089

**SPECIFY**

- Power (AC, 1-phase):

<b>50 Hz</b>	<b>60 Hz</b>
100V <b>#2804</b>	100V <b>#2730</b>
110V <b>#2805</b>	115V <b>#9901</b>
123.5V <b>#2811</b>	200V <b>#2732</b>
200V <b>#2806</b>	208V <b>#9902</b>
220V <b>#2813</b>	230V <b>#9904</b>
235V <b>#2814</b>	

- Transmission Code: **#9761** for EBCDIC, **#9762** for ASCII. **Field Installation:** Yes.
- Character Set: One of the available character sets and the type size must be specified (no charge) on the initial order ... see "Type Catalog" pages for specified characters in each set and price for additional sets.
- Printer Tape Punch: Order under P/N 120910 on MES  
... one punch is furnished per installation at no charge.
- Identification: **#9350** provides an identification function by which a CPU under stored program control and operating on a switched public network, can identify a legitimate 3780. **Prerequisites:** **#7651**.
- Terminal Use (point-to-point): **#9711** for communications with another 3780 or 2780. Provides "Bell" key and light indicator to signal remote terminal that voice mode is desired. Receipt of "Bell" code sounds alarm. When communication is alternatively with a CPU and another 3780 or 2780, via switched network. **Field Installation:** Yes.
- 3704/3705 Medium Speed Local Attachment: Specify Modem or Data Set Attachment ... see below. Either **#2903** (2000 or 2400 bps) or **#2983** (1200 bps), only. Also Communications Facilities ... see below. **#9402** for half-duplex.
- Modem or Data Set Attachment: One of the following, depending upon facility to be used, must be specified:  
**#2903:** For attachment to the 3977 mdl 2 for operation at 2000 or 2400 bps. **Prerequisites:** **#7705** and either **#2995** for 2000 bps or **#2996** for 2400 bps.  
**#2981:** Switched Network Attachment. Required for operation on PTT switched facilities. **Note:** See **#7705** to determine if required. **Maximum:** One. The 3976 mdl 3 will operate on the switched network without **#2981**. **Prerequisites:** **#7651** ... not required for Manual Answer.  
**#2982:** Required for the 3976 Modem mdl 3 on switched lines or PTT mandatory modems at 1200 bps on switched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin. Includes the function of **#2981**. **Prerequisites:** **#7705**.  
**#2983:** Required for the 3976 Modem mdl 3 on nonswitched lines or PTT mandatory modems at 1200 bps on nonswitched lines complying with CCITT Recommendations (1976) V.23, V.24, V.28

and ISO Standard 2110. Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin. **Prerequisites:** **#7705**.

**#9120:** Required for PTT mandatory modems at 2400 bps on switched lines complying with CCITT Recommendations (1976) V.24, V.26bis, V.28 and ISO Standard 2110. Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin.

**#9121:** Required for IBM 2400 bps Integrated Modem or the 3872 modem or PTT mandatory modems at 2400 bps on nonswitched lines complying with CCITT Recommendations (1976) V.24, V.26, V.28 and ISO Standard 2110 (Japan only) or 2400 bps on the NTT DDX Network +) (Canada only) or Facility K3M +). Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin.

**#9124:** Provides 4800 bps. Required for the 3874 Modem or PTT mandatory modems at 4800 bps on nonswitched lines complying with CCITT Recommendations (1976) V.24, V.28 and V.27 or V.27bis, and ISO Standard 2110 (Japan only) or 4800 bps on the NTT DDX Network +) (Canada only) or Facility K4M +). Other non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Bulletin.

**#9126:** For 3875 at 7200 bps with backup half-speed on leased facilities.

- Communications Facilities: Features specify 3780 control of the data set and do not necessarily correspond to the communications facility. **Field Installation:** Yes. Specify as indicated below:

**#9402:**

Switched Network Operation

Leased Private Line (or equivalent privately owned).

Multipoint ... (half-duplex), although the communications facility may be 2- or 4-wire.

Point-to-point ... for 2-wire (half-duplex) communications facilities.

If the 3780 Integrated Modem or the 3872, or 3875 Modem is used.

**#9404:**

For 4-wire (full-duplex) facilities.

- Extended Retry Transmission: **#9150** extends the maximum retry count from three (12 seconds) to a maximum of 15 (48 seconds) in an effort to recognize a valid response to the last block of data transmitted, prior to sending an EOT code and timing out with an error condition.
- Data Set Cable: A 20 foot data set cable is provided as standard. If a longer cable is required, specify **#9021**, indicating length as a quantity of 25, 30, 35 or 40 feet.
- WACK Response: **#9936** if initial WACK (Wait before transmit - positive ACKnowledge) is to be transmitted immediately. All subsequent WACK responses are transmitted after a 2-second delay.
- Color: **#9041** for red, **#9042** for yellow, **#9043** for blue, **#9045** for gray, **#9046** for white.
- Language Groups:  
English UK **#2927**      German **#2929**  
English US **#2750**      Italian **#2932**  
French **#2928**      Japanese **#2930**

**SPECIAL FEATURES**

**Component Selection (#1601):** Provides the capability of specific 3780 I/O device selection. In addition to component selection, it provides priority output selection and Multipoint Data Link Control selection capability. It is a prerequisite for attachment of a 3781 Card Punch. **Field Installation:** Yes.

**Direct Line Attachment (#2939):** Provides modem/line isolation required by some PTTs. **Prerequisites:** **#5600** or **#5602**.

**EBCDIC Transparency (#3601):** Allows the 3780 to receive and transmit all 256 EBCDIC bit combinations as data characters. Variable length records cannot be transmitted if card I/O or printer is selected. Either normal or transparent text can be received without the "transparency" switch being in the transparency position. The switch must be "On" for transmitting in transparency. If a terminal on a

**3780 Data Communications Terminal (cont'd)**

multipoint line requires this feature, all terminals on that line must also have this feature. **Field Installation:** Yes. **Prerequisites:** #9761.

**Keylock (#4650):** A key-operated Power-On switch for the 3780. The key must be inserted and turned to the "On" position before the control unit Power-On switch is operative. When the key is turned off, power is removed from the control unit. For additional or replacement keys, see "Accessories". **Field Installation:** Yes.

**Multipoint Data Link Control (#5010):** Allows multiple 3780s to be used on the same communications line with a CPU. Terminal can be polled or selected when operating as a tributary station on a multipoint system. All 3780s installed on the same line facility require this feature and must use the same transmission code and data set attachment. Other BSC devices (2780, S/360, S/370, 4300 processors) as tributary stations, can be on a multipoint line with a processor control station. **Limitations:** If Terminal Use (#9711) is installed, it must be removed prior to installation of this feature. **Field Installation:** Yes.

**Integrated 2400/1200 bps Modem (#5600, #5602, ): Provides an integrated 2400 bps modem with half-speed backup capability. Equivalent to and compatible with similarly featured 3872 modems. Two versions cover different communications requirements, as described in the separate feature descriptions. Operator controls are integrated with the 3780 operator panel. Built-in diagnostic functions are provided for local and remote testing. See M2700, 3872 pages and "Prerequisites" above for additional information on allowable machine/system combinations and required features. **Maximum:** One #5600 or #5602.**

**Leased Line Point-to-Point Modem (#5600):** Provides point-to-point terminal-terminal and terminal-CPU communications with a similarly equipped 3780 or a 2780, 3780, S/360, S/370 or 4300 Processors equipped with appropriate features and an equivalent featured 3872 modem. Includes manual equalization control. **Field Installation:** Yes. **Prerequisites:** #9121, #9402, #9711 may be required, depending upon application. **Specify:** (Japan only+ #2943 must be ordered for attachment to NTT D-1 service. +) #9021 plus length, if non-standard cable length is required.

**Leased Line Multipoint Tributary Modem (#5602):** Operates on a multipoint network with a controlling CPU. Other 3780s on the same line facility must have either #5602 or a 3872 modem with Multipoint Tributary (#5101 or #5102); other BSC tributary devices on the same line facility must have a 3872 modem with #5101 or #5102. Utilizes nonswitched telecommunication lines of a normal quality (see line specifications in *IBM 3872 Modem User's Guide* (GA27-3058). **Limitations:** #9711 cannot be installed. **Field Installation:** Yes. **Prerequisites:** #9121, #9402, #5010. **Specify:** (Japan only+ #2943 must be ordered for attachment to NTT D-1 service. +) #9021 plus length, if non-standard cable length is required.

**Print Positions, Add'l (#5701):** Provides an additional 24 print positions for the 3780 printer. **Field Installation:** Yes.

**Switched Network Control (#7651):** To attach to a switched network, provides automatic answering of incoming calls initiated by another terminal or central computer over common carrier switched (dial-up) facilities. The line must be equipped with an appropriate data set with auto answer capability and the terminal must be in "ready" status. Provides automatic disconnect when disconnect sequence is received or when no data is transmitted/received for 20 seconds. Disconnect causes audible alarm to sound. **Field Installation:** Yes.

**Synchronous Clock (#7705):** A synchronous clock for use with modems which do not have an internal clock, or for use with 3704/3705 Medium Speed Local Attachment Line Set, Type 1F. Will operate at 600 bps, 1200 bps, 2000 bps, or 2400 bps. The device with which the 3780 will communicate must also have an internal clock operating at the same bps rate. **Specify:** #2701 for 600 bps, #2702 for 1200 bps, #2703 for 2000 bps, #2704 for 2400 bps. If speed is 1200 bps, alternative speed of 600 bps will be provided via speed selector switch. **Field Installation:** Yes.

**MODEL CONVERSIONS (None)**
**ACCESSORIES**

**Locks and Keys:** The 3780 with Keylock (#4650) is shipped with two keys. Additional or replacement keys must be ordered only from IBM. A letter of authorization with key identification number (stamped on key) must accompany the order. **Note:** Without key identification number, a new Keylock (#4650) special feature must be ordered. Allow seven weeks for delivery.

**SUPPLIES (None)**

## 3800 PRINTING SUBSYSTEM MODEL 1

**THERE IS MORE THAN 1 TEXT VERSION OF THIS PRODUCT**

### PURPOSE

The 3800 model 1 is the printer output unit for S/370 models 145, 145-3, 148, 155II, 158, 158 Submodel 2, 165II, 168, 3031, 3032, 3033, 3081, 3083, 3084 and 4300 Processor. A feature allows data input from magnetic tape without printer output unit attachment to a system.

### MODEL 1

**Model 1 001:** (NO LONGER AVAILABLE)

**Prerequisites:** A control unit position on a system channel and/or Tape-to-Printing Subsystem Feature (#7810).

#### Processor Attachment:

- S/370 model 145 (excluding 3145-3) -- byte multiplexer channel (standard), selector channels (first one is standard), block multiplexer channels (special features); see M3145 pages. Attachment to the byte multiplexer channel is not recommended. Selector channel attachment is not recommended unless dedicated.
- S/370 model 145-3, 148 -- byte multiplexer channel (standard), block multiplexer channels; see M3145-3, 3148 pages. Attachment to the byte multiplexer channel is not recommended.
- S/370 model 155II, 158 -- byte multiplexer channel (standard), 2nd byte multiplexer channel (special feature), block multiplexer channels (first two are standard); see M3155, 3158, 3158-3 pages.
- S/370 model 165II, 168 -- Selector channel of 2860, basic multiplexer channel of 2870, selector subchannel (special feature) of 2870, shared or non-shared subchannel of 2880; see M2860, 2870, 2880 pages. Selector channel attachment is not recommended unless dedicated.
- 3031 or 3032 Processor -- byte multiplexer channel (one is standard), block multiplexer channels (five are standard); see M3031, 3032 pages. 3033 Processor -- byte multiplexer channels (two are standard), block multiplexer channels (ten are standard); see M3033 pages.
- 3081, 3083, 3084 Processor -- byte multiplexer channels, block multiplexer channels; see M3081, 3083, 3084 pages. Attachment to a byte multiplexer mode channel is not recommended.
- 4300 Processor -- byte multiplexer channel, block multiplexer channel. Attachment to the byte multiplexer is not recommended.
- 3090 Processor -- byte multiplexer channels; see M3090 pages. Attachment to a byte multiplexer mode channel is not recommended.
- Tape-to-Printing Subsystem (#7810) -- in lieu of or in addition to system channel attachments above; see "Special Features".

**Limitations:** Prints on discrete form sizes in either of two standards. Common Use Standard utilizes five forms depths (3-1/2, 5-1/2, 7, 8-1/2 and 11 inches) and ten forms widths (measured edge to edge: 6-1/2, 8-1/2, 9-1/2, 9-7/8, 10-5/8, 11, 12, 13-5/8, 14.3 and, 14-7/8 inches) which permute to 50 discrete sizes. Common Use Option Forms are refolded into lengths of 7 (2 x 3-1/2), 8-1/2, and 11 inches (2 x 5-1/2).

The ISO Standard utilizes six forms depths (3- (78.2mm), 4- (101.6mm), 6- (152.4mm), 8- (203.2mm), 10- (254.0mm) and 12-inch

depths (304.8mm)) and 13 forms widths (measured edge to edge: 165mm, 180mm, 215mm, 235mm, 250mm, 270mm, 280mm, 305mm, 322mm, 340mm, 363mm, 375mm, 378mm) which permute into 78 discrete sizes. ISO Option forms are refolded into 6-, 8-, 10-, and 12-inch lengths.

Character and forms overlay printing are restricted from the first and last half inches of forms lengths. A printed line can begin a minimum of 0.5 inches from the left page edge and must end no nearer than 0.8 inches from the right-side edge of the paper for all widths except the 14-7/8 inch width for which the printed lines must end at least 0.675 inches from the right.

Paper must be from 15 lb (56.4 g/m(2)) to 24 lb (90.2 g/m(2)) basic weight except for OCR for which the minimum paper weight is 20 lb (75.3 g/m(2)). See GA26-1633-0 for details of weight and other forms considerations. Left-hand side of form is a fixed location in the machine, and print line adjustment is made by electronically moving the line. First print positions can move to the right 5.7 inches but will cause an equivalent number of positions at the right end to be moved beyond the above-defined print line boundaries.

It is recommended that printing not occur within 0.100 inches of any binder holes or corner cuts within the form.

### HIGHLIGHTS

Prints on single-part continuous forms equipped for either of two paper size standards: The Common Use Option, which supports 50 discrete paper sizes, or the ISO option, which supports 78 discrete paper sizes. Printing is repeated for multiple copies, and every copy is of "original" quality.

#### Print Speed Range: Common Use Option

Forms Length Inches	Forms Per Min. Up to:	Lines Per Minute*		
		6 lpi Up to:	8 lpi Up to:	12 lpi Up to:
3-1/2	526	7,890	10,520	15,780
5-1/2	334	9,018	12,024	18,036
7	263	9,468	12,624	18,936
8-1/2	215	9,675	12,900	19,350
11	167	10,020	13,360	20,040

#### ISO Option

Forms Length Inches	Forms Per Min. Up to:	Lines Per Minute*		
		6 lpi Up to:	8 lpi Up to:	12 lpi Up to:
3	597	7,164	9,552	14,328
4	454	8,172	10,896	16,344
6	286	8,580	11,440	17,160
8	215	9,030	12,040	18,060
10	167	9,018	12,024	18,036
12	143	9,438	12,584	18,876

\* Single Copy Speeds

Printer job throughput can vary depending upon form length, number of copies needed, and functions exercised.

52K-byte storage is standard for page buffering. Storage is reduced to 42K when data input is from magnetic tape in lieu of system.

**Pitches:** 10, 12 and 15 characters per inch (cpi) are standard.

**Print Line Maximums:** Of 136 positions at 10 cpi, 163 positions at 12 cpi, 204 positions at 15 cpi; pitches (10, 12 and 15 cpi) can be intermixed within a page or line; vertical line spacings are 6, 8, and 12 lines per inch, with intermixed line spacing within a page being possible.

## Standard Character Sets

Character Style	Pitch (cpi)			Special Under-scored
	10	12	15	
Gothic	X	X	X	Yes
Gothic 15 Condensed			X	Yes
Text 1 (Uppercase)	X			Yes
Text 2 (Lowercase)	X			Yes
OCR A	X			
Format	X	X	X	
Katakana	X	X		

**Note:** Includes all standard World Trade National Use Graphics.

Character sets are organized into blocks of up to 64 characters and are held in subsystem read-only storage.

The 3800 Printing Subsystem has electronic character generation using Writeable Character Generation Storage -- 128 Writeable Character Generation Storage positions are standard and organized into two 64-character Writeable Character Generation Modules (WCGM); character sets are program-selected without operator intervention and dynamically loaded into hardware WCGMs - when operating under control of feature #7810, character sets containing national use graphics are loaded from the 3800 control file tape if any one of the following is used:

1. MVS/370 Data Facility Product (5665-295);
2. MVS/XA Data Facility Product (5665-284); or
3. Offline IBM 3800 Utility program product (5748-UT2) or, if one of these program products is not used, from separate tape available as a specify feature (see "Specify" under #7810).

An additional increment of 127 Writeable Character Generation Storage positions (optional) provides dynamic storage for printing four character styles and/or pitches with one data set -- this represents up to 255 graphics online with no throughput loss; dynamic storage allows character substitution under program control; a customer may design his/her own characters. When operating under control of #7810, customer-designed characters require use of any one of the following:

1. MVS/370 Data Facility Product (5665-295);
2. MVS/XA Data Facility Product (5665-284); or
3. Offline IBM 3800 Utility program product (5748-UT2).

Character substitution involving national use graphics only can be accomplished without any one of the following:

1. MVS/370 Data Facility Product (5665-295);
2. MVS/XA Data Facility Product (5665-284); or
3. Offline IBM 3800 Utility program product (5748-UT2) by means of separate tape available as a specify feature (see "Specify" under #7810).

By using the Gothic 15 style font (15 characters/inch at 8 lines/inch), reports can be reduced from 11 x 14-7/8 inches to the more convenient size of 8-1/2 x 11 inches thereby increasing throughput while reducing both forms costs and filing space requirements. The application of 12 lpi vertical spacing with the Gothic 15 Condensed character set can result in a further reduction in paper volume of up to about 30% beyond the savings projected in reducing page sizes by applying the 15 pitch character set at 8 lpi.

**Optical Character Recognition (OCR):** Printing alphanumeric OCR A and the less stylized OCR B fonts can be intermixed with non-OCR fonts with no reduction in printing throughput. Documents may be processed by the 1287, 1288 and 3886 Optical Character Readers. Refer to the appropriate sales manual pages for specific capabilities.

Optical Character Recognition (OCR printing in OCR-A font and OCR-B font) in numeric representation plus three special characters or symbols can be done only on codelines 18, 34, and 108 of turnaround documents (1/3 in., 2/3 in., and 2-1/4 in. from bottom of document) and may require some of the following RPQs YB0029, XA9753, XA9754. These documents can be read on the 1270, 1275 Optical Reader Sorters (cannot read codeline 34), and the 3890 model C or D Document Processor. The special characters are the (hook), (chair), and (fork) of the OCR-A font and the special symbols of plus sign, less than sign, and greater than sign of the OCR-B font. The technology used by electro-photographic printers is radically different than that of impact printers. Toner is deposited on paper and fused to it with heat. Several passes of paper printed in this fashion through a reader/sorter may cause higher reject rates than the user currently experiences. Therefore, to assure satisfactory performance in reading OCR documents printed on electro-photographic printers, and to achieve low reject rate, it is necessary that IBM personnel refer to the "OCR Marketing Guide for 3800/1270, 1275 and 3890". For further information refer to the reader sorter manuals, "Reference Manual for IBM 3800 Printing Subsystem - OCR Document Preparation", GA26-1646, and the "OCR Print Quality Guide".

**Note:** The OCR characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the "United States of America Standard Character Set for Optical Character Recognition, size A, USAS X3.17-1966" for OCR-A font (also referred to as ANSCS OCR) and the "European Computer Manufacturers Association's Standard ECMA-11 for Alphanumeric Character Set OCR-B for Optical Recognition 2nd Edition, October 1971" for OCR-B font.

**Text Character Set:** Uses upper- and lowercase characters, serif design, special graphics, with no reduction in throughput.

**Format:** Is in 10, 12 and 15 pitch, with merge format and data, and is program-controlled. Format 10, 12, and 15 pitch - merge format and data - program controlled for online operation, for offline with feature #7810 format character sets requires any one of the following:

1. MVS/370 Data Facility Product (5665-295);
2. MVS/XA Data Facility Product (5665-284); or
3. Offline IBM 3800 Utility Program Product (5748-UT2).

**Copy Modification Function:** Identifies copies with legends, phrases or names (e.g., "Customer Copy", "For Accounting Use Only", etc.), addresses each report copy to speed distribution, spots carbon or field blackout functions, is identification and deletion program controlled; has customized forms with the identification, deletion and formatting functions. When operating under control of #7810, Copy Modification Function requires any one of the following:

1. MVS/370 Data Facility Product (5665-295);
2. MVS/XA Data Facility Product (5665-284); or
3. Offline IBM 3800 Utility Program Product (5748-UT2).

**Forms Overlay:** Optical image system prints high-quality document and report formats, designs or other constant data, merge format and data, and is program controlled. When operating under control of #7810, overlay is invoked from the operators panel or by any one of the following:

1. MVS/370 Data Facility Product (5665-295);
2. MVS/XA Data Facility Product (5665-284); or
3. Offline IBM 3800 Utility program product (5748-UT2).

**Single Part Continuous Form Output:** Includes custom print forms, and features no deleaving, no carbon disposal, faster turnaround, program control of copy quantity, with up to 255 copies. Job separation is by perforation marking use Mark Form function.

**Optional Burster-Trimmed-Stacker Output:** Burster/trimmer bottle-necks eliminated; offset separation between data set copies; re-

moval of output while running; first-in, first-out job sequence; trimmed edges.

**Optional Channel Switching:** Manual switches provide system configuration flexibility through the use of the 2914 Manual Switch model 1 (RPQ 880882) or the Two Channel Switch feature (#8170); automatic switching is provided by the Dynamic Two-Channel Switch feature (#8171) for two processors in a tightly coupled MP configuration, and two channels on a single processor providing alternate path capability.

**Laser Safety:** The 3800 contains a laser assembly. In IBM's opinion, the 3800, including the laser assembly, is designed to comply with the safety standards of the U.S. Department of Health, Education and Welfare (21 CFR 1040). Separate registrations by the customer may be required by some states. A number of countries presently have, and others are considering, the adoption of regulations governing the use of laser products. The customer is responsible for determining the extent of regulations governing the use of laser products at their location.

## SPECIFY

### ● Power (AC, 3-phase):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

### ● Color (for end cover only; machine is cloud white): Specify #9041 for red, #9042 for yellow, #9043 for blue, or #9045 for gray.

### ● Machine Nomenclature:

English #2927	Italian #2932
French #2928	Spanish #2931
German #2929	

### ● Paper Sizes:

#2741 - Common Use  
#2742 - ISO

Common Use Paper Sizes (#2741): Enables the 3800 to process the following forms depths and widths:

- Five Forms Depths (in inches):  
3-1/2, 5-1/2, 7, 8-1/2, 11
- Ten Forms Widths (in inches, edge to edge):  
6-1/2, 8-1/2, 9-1/2, 9-7/8, 10-5/8, 11, 12, 13-5/8, 14.3, 14-7/8

Limitations: Cannot be installed with ISO Paper Sizes #2742. Maximum: One. Field Installation: Yes.

ISO Paper Sizes (#2742): Enables the 3800 to process the following forms depths and widths:

- Six Forms Depths  
(in inches): 3, 4, 6, 8, 10, 12  
(in mm): 76.2, 101.6, 152.4, 203.2, 254.0, 304.8
- 13 Forms Widths (in mm, edge to edge):  
165, 180, 215, 235, 250, 270, 280, 305, 322, 340, 363, 375, 378

Limitations: Cannot be installed with Common Use Paper Sizes (#2741). Maximum: One. Field Installation: Yes.

### ● Tool Kit:

For rental customer, select one:

- First 3800 (model 1 or 3) ordered, specify #9330 when ordering a model 1.
- If unit ordered is second or higher 3800 model 1 or 3 to be installed, no additional tool kit is required.
- If required for a multiple machine installation because of physical locations of machines, an additional tool kit(s) is available on a no-charge MES. (See M3800-3 pages if a model is at the alternate location.)

For purchase customer, select one:

- For each new purchase 3800 model 1, specify #9330.
- When installed 3800 model 1s are purchased, a tool kit (#9330) is to be ordered on a no-charge MES for each machine.

**Note:** A Tool Kit (#9220) is required with Burster-Trimmer-Stacker (#1490); see #1490 below.

## SPECIAL FEATURES

**Burster-Trimmer-Stacker (#1490):** (NO LONGER AVAILABLE) Provides an additional output stacking mode. Bursts the five Common Use forms lengths or the six ISO lengths to individual sheets and stacks sheets sequentially. It also trims the left and right 12.7mm (0.5 inch) carrier strips from output sheet. Maximum: One. Field Installation: Yes. Specify: One tool kit.

For rental customer -- specify #9220 for first Burster-Trimmer-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.

For purchase -- specify #9220 on each Burster-Trimmer-Stacker feature order. When installed Burster-Trimmer-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature.

**127 Writeable Character Generation Storage Positions, Add'l (#5401):** (NO LONGER AVAILABLE) Additional increment of 127 positions allows up to 255 graphics to be printed within a data set. Maximum: One. Field Installation: Yes.

**Remote Switch Attachment (#6148):** (NO LONGER AVAILABLE) To attach the Two-Channel Switch (#8170) to a configuration control panel. Maximum: One. Field Installation: Yes. Prerequisites: #8170.

**Tape-To-Printing Subsystem Feature (#7810):** (NO LONGER AVAILABLE) Allows the 3800 to be operated from magnetic tape data. Either 3411/3410 or 3803/3420 tape systems may be attached. With the feature installed, the 3800 may be operated either offline under operator control or online. Up to eight tape control units may be attached provided that power sequencing and control connection for all other than one are provided by a system; and provided that all 3803 control units have at least one path, which may be switchable, to a S/360, S/370 or 4300 processor. This feature will accept the non-IBM system print tape formats described below.

Burroughs: B7000/B6000 Print Backup Tapes. For further detail, refer the customer to:

"B7000/B6000 Series System Software Operational Guide" Volume 1 (form #5001563), Section 1 (Backup)

Tape files must be 7- or 9-track, EBCDIC coding, and ANSI (USAS) standard tape labels and data formats. For further detail, refer the customer to:

"B7000/B6000 Series I/O System Reference Manual" (form #5001779).

For definition of line printer control words, refer the customer to: "Burroughs B6700 Handbook" (form #5000276).

## MACHINES

Honeywell: Series 60 (level 66/6000) Bulk Media Conversion program formats and Standard System formats that have the following characteristics:

- Variable-length records
- Binary or BCD mode
- 7- or 9-track
- Standard labeled or non-labeled
- Low- or high-density
- Standard printer commands with or without edit characters

For further details, refer the customer to the following Honeywell publications:

"DD11 Bulk Media Conversion"  
"DD07 File and Record Control"  
"DB82A I/O Programming"

Sperry Univac: 1100 series systems System Data Format (SDF) Symbiont print tape. For further detail refer the customer to:

"Sperry Univac 1100 Series Executive System Volume 3 System Processors" (form #4144.3).

Tape files may be 7- or 9-track, Field Data or ASCII

For further description of tape labels and file format and definition of line printer control functions refer the customer to:

"Sperry Univac 1100 Series Executive System Volume 2 EXEC" (form #4144.2).

Limitations: Selection of the non-IBM system tape format to be used must be made by the operator before printing.

Where more than one print character is represented by one 8-bit byte (data packing) on the non-IBM system print tape, applications using character densities above 8,160 characters per 11-inch page may impact 3800 overall throughput and must be evaluated.

When using non-IBM system print tape formats, control tapes produced by any one of the following: 1) MVS/370 Data Facility Product (5665-295); 2) MVS/XA Data Facility Product (5665-284); or 3) Offline IBM 3800 Utility program product (5748-UT2) are supported only with an IBM record format of VBM (variable-length-block machine language) with standard IBM labels or no labels.

Maximum: One. Field Installation: Yes. Specify: EBCDIC and Japanese Katakana character arrangements are standard with #7810. A full set of national use graphics is included in any one of the following: 1) MVS/370 Data Facility Product (5665-295); 2) MVS/XA Data Facility Product (5665-284); or 3) Offline IBM 3800 Utility program product (5748-UT2). When any one of these program products is not to be installed or to be installed, specify one of the

following for the standard WT national use graphic arrangements, if required:

Brazil	#2975	Italy	#2968
Canada (French)	#2977	Japan	#2955
France	#2970	Portugal	#2959
Germany	#2957	Spain	#2960
International	#2950		
Spanish Speaking	#2969		

Prerequisites to specify features for #7810: The specify features for national use graphic arrangements are supplied on magnetic tape and shipped with #7810. For tape density and format required, specify one:

#2704 9-track 1600 bpi  
#2705 9-track 6250 bpi

Channel Attachment Features, or Tape-to-Printing Subsystem feature #7810 in lieu of or in addition to channel attachment.

**Two-Channel Switch (#8170):** (NO LONGER AVAILABLE) To attach the 3800 to two S/370 or 4300 processor channels which may be on the same processor or on two different processors (both interfaces must have the same device address). The Two-Channel Switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel. Maximum: One. Field Installation: Yes.

**Dynamic Two-Channel Switch (#8171):** (NO LONGER AVAILABLE) Provides the additional capability of an automatic two-channel switch. The switch is designed to furnish symmetric two-processor support for tightly coupled multiprocessor systems, and to be attached to two channels from a single processor in order to provide alternate path capability. For either tightly coupled multiprocessor or single processor attachments, data transfer occurs on only one channel path at a time. Maximum: One. Field Installation: Yes. Prerequisites: #8170.

## MODEL CONVERSIONS

A purchased 3800 model 1 can be field converted to a 3800 model 3 by MES; see text for 3800 Model 3.

## ACCESSORIES (NONE)

## SUPPLIES

Contact your Country DP Supplies Coordinator.

## 3800 PRINTING SUBSYSTEM MODEL 2

### PURPOSE

The 3800 model 2 allows the printing of an additional 8,192 Extended Graphics characters\* in addition to the functions and features already available on the 3800 Printing Subsystem except for the Tape-to-Printing Subsystem Feature (#7810). Installed 3800 model 1s can be field converted to the 3800 model 2.

**Reference:** The 3800 Printing Subsystem model 1 "Purpose", "Highlights", "Limitations" and "Prerequisites" apply to the model 2 also.

### MODEL 2

**Model 2 002:** (NO LONGER AVAILABLE)

**Restrictions:** The Tape-to-Printing Subsystems Feature (#7810) cannot be concurrently installed with the 3800 model 2. Installed 3800 model 1s which have #7810, must have it removed if conversion to the 3800 model 2 is desired. All other features of the 3800 model 1 may be installed.

**Prerequisites:** The 3800 Enhancements for MVS and VS1 must be installed as a prerequisite (see DP Programming Announcement Letters ZP79-0265 and ZP79-0266 for MVS, and ZP79-0329 for VS1). In addition, the 3800 model 1 prerequisites also apply to the model 2.

### HIGHLIGHTS

- **Hardware**

The Extended Graphics capability is designed to provide an additional character set for the 3800 Printing Subsystem. The 3800 model 2 supports 191 single-byte characters plus a special font containing up to an additional 8,192 two-byte characters\* at speeds up to 10,020 lines per minute. This capability which is available with the model 2 includes the Japanese ideographic characters, Katakana and Hiragana characters, the Korean Hangeul, the English, Russian, and Greek alphabets; Arabic and Roman numerals; and special symbols.

The Extended Graphics capability may be intermixed with other character sets (single-byte) available with the 3800 model 1. The raster patterns of the Extended Graphics character set are loaded under program control. A 3800 model 2 with this capability may process jobs not containing Extended Graphics data without affecting standard 3800 model 1 functions.

The Extended Graphics characters are formed by combining two standard 3800 print cells, which create 6 and 7.5 horizontal graphic characters per inch. Before Extended Graphics characters can be printed they are loaded from the host processor into an Extended Graphics storage buffer (available only with the model 2). Once loaded, the Extended Graphics storage is preserved until the 3800 model 2 microcode is subsequently reloaded or 3800 power is removed. When this capability is enabled (under program control) and in use, it does not allow the use of WCGM 1. However, any character set stored in WCGM 1 when Extended Graphics mode was enabled is left unchanged and may be used when this capability is subsequently disabled and not in use. Also, the microcode requires an additional 4K bytes of the standard 3800 page buffer, leaving 48K. Two-byte characters cannot be underscored utilizing the hardware function. If the user wishes to underscore certain two-byte characters, the corresponding raster pattern must be designed including the underscore. Single-byte characters may still use the hardware underscore function.

The Extended Graphics character set for Kanji and Chinese consists of 7,190 characters including one blank at 7.5 characters per inch (pitch), 1 special blank character, and 410 characters including one blank at 6 characters per inch (pitch). Also, in addition to the IBM-supplied characters, the user may define 309 characters at 7.5-pitch and 282 characters at 6-pitch. The 6-pitch and 7.5-pitch characters that represent the same graphic symbol are addressed by unique code points.

The Extended Graphic Character set for Korean Hangeul consists of 3,700 Hangeul characters, 96 EBCDIC Characters including 2 blank characters at 7.5 characters per inch (pitch), and 410 characters including 1 blank character at 6 characters per inch (pitch). In addition to the IBM-supplied characters, the user may define 374 characters at 7.5-pitch and/or at 6-pitch. A maximum of 4,580 characters are supported.

These Extended Graphics characters of 6- and 7.5-pitch may be intermixed on a line and printed at either 4 or 6 lines per inch. The 3800 model 2 will have the same throughput performance as a 3800 model 1 except for those jobs affected by the reduced page buffer size.

\* Includes 3 blank characters.

- **DPI/CESA**

The 3800 model 2 requires DPI/CESA review at proposal and order entry and credit times. For countries other than Japan, the first three proposals must be reviewed by IBM Japan DPI/CESA function.

- **Programming**

The Extended Graphics capability is supported by the OS/VS2 MVS Release 3.8 and OS/VS1 Release 7.0 operating systems.

The Extended Graphics Programming Support will provide for the:

- Recognition of Extended Graphics font through existing JCL or SETPR parameters.
- Creation of Extended Graphics font table using IBM assembler language.
- Processing of Extended Graphics font.
- Creation of user-designed Extended Graphics characters through existing function of the 3800 IEBIMAGE utility.
- Loading of Extended Graphics characters into the 3800 Extended Graphics storage.
- Processing of data in either Extended Graphics mode or standard (single-byte) mode.

**Publications:** The following publications are for the model 2 and are in addition to those already available with the 3800 model 1:

- N: GA18-2054 (Japanese), GA18-2054 (English), IBM 3800 Printing Subsystem Extended Graphics
- SY18-2035 (English), IBM 3800 Printing Subsystem Extended Graphics Programming Logic
- N: GX18-2035 (Japanese), GX18-2035 (English), IBM 3800 Printing Subsystem Character Design and Coding Form for Extended Graphics
- N: GC18-0611 (Japanese), IBM Japanese Graphic Character Set Reference Manual
- N: GC18-0612 (Japanese), IBM Japanese Graphic Character Set KANJI Number Dictionary
- N: GC18-0613 (Japanese), IBM Japanese Graphic Character Set Keyboard Operator's Handbook
- N: GA18-1071 (Japanese), Character Design Guide for IBM 3800 model 2

## SPECIFY

The following specify codes apply only to the 3800 model 2. These specify codes are in addition to those listed for the 3800 model 1 which should also be used when ordering a new 3800 model 2 from the factory.

- Extended Graphics Hardware (Mandatory for 3800 model 2): #7S0278.
- For the Extended Graphics programs, the following codes should be used on the program ordering sheet:
  - Extended Graphics Device Support
    - #5799-WRM for OS/VS2 MVS
    - #5799-WRN for OS/VS1
  - Extended Graphics Device Support supplied on magnetic tape: #9029 9-track 1600 bpi -- #9031 9-track 6250 bpi.
  - Microfiche for Program Listings (Optional): #7050 -- Form #SYA8-2037 for OS/VS2 MVS -- Form #SYA8-2038 for OS/VS1.

## SPECIAL FEATURES

**Burster-Trimmed-Stacker (#1490):** (NO LONGER AVAILABLE) Provides an additional output stacking mode. Burst the five Common Use forms lengths or the six ISO lengths to individual sheets and stacks sheets sequentially. It also trims the left and right 0.5 inch (12.7mm) carrier strips from output sheet. Maximum: One. Field Installation: Yes. Specify: (1) tool kit #9220 required for CE maintenance. Contact the account Field Manager for requirements.

- For rental customer -- specify #9220 for first Burster-Trimmed-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.
- For purchase -- specify #9220 on each Burster-Trimmed-Stacker feature order. When installed Burster-Trimmed-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature.

**127 Writable Character Generation Storage Positions, Add'l (#5401):** (NO LONGER AVAILABLE) Additional increment of 127 positions allows up to 255 graphics to be printed within a data set. Maximum: One. Field Installation: Yes.

**Channel Attachment Features:** (NO LONGER AVAILABLE) For Tape-to-Printing Subsystem Feature #7810 in lieu of or in addition to channel attachment.

**Remote Switch Attachment (#6148):** (NO LONGER AVAILABLE) To attach the Two-Channel Switch (#8170) to a configuration control panel. Maximum: One. Field Installation: Yes.

**Two-Channel Switch (#8170):** (NO LONGER AVAILABLE) To attach the 3800 to two S/370 or 4300 Processor channels which may be on the same processor or on two different processors (both interfaces must have the same device address). The Two-Channel Switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel.

**Dynamic Two-Channel Switch (#8171):** (NO LONGER AVAILABLE) Provides the additional capability of an automatic two-channel switch. The switch is designed to furnish symmetric two-processor support for tightly coupled multiprocessor systems, and to be attached to two channels from a single processor in order to provide alternate path capability. For either tightly coupled multiprocessor or single processor attachments, data transfer occurs on only one channel path at a time. Prerequisites: #8170. Maximum: One. Field Installation: Yes.

## MODEL CONVERSIONS

Model 1 to model 2 is field installable.

## ACCESSORIES (NONE)

## SUPPLIES

Contact your Country DP Supplies Coordinator.

## 3800 PRINTING SUBSYSTEM MODEL 3

### PURPOSE

Printer output unit for S/370 models 158, 168, and the 3031, 3032, 3033, 3081, 3083, 3084, 3090, 4341, 4361 Model Group 5 and 4381 Processors.

**Note:** Operating System support for the model 3 is provided under MVS/370 and MVS/XA. For details refer to 3800 Printing Subsystem Model 3 announcement letter 182-095, dated November 1, 1982 and to New Support for IBM 3800 Printing Subsystem Model 3 announcement letters 284-036, 037, 038 and 039 dated February 7, 1984. Prerequisite programming requirements are contained in announcement letters 184-025; 284-074, 075, 077, 078, 079 and 081.

### MODEL 3

#### Model 3 003

**Prerequisites:** A control unit position on a system channel is required.

**Note:** The model 3 does not provide for attachment to a byte multiplexer channel.

#### Processor Attachment:

- S/370 model 158: Block multiplexer channels (first two are standard). The model 158-1 requires EC 278240 to operate with the 3800 model 3. The model 158-3 requires EC 278249 to operate with the 3800 model 3. See M3158-1, 3158-3 pages.
- S/370 model 168: Selector channel of 2860, selector subchannel (special feature) of 2870, shared or non-shared subchannel of 2880; see M2860, 2870, 2880 pages. Selector channel attachment is not recommended unless dedicated to the printer; see M3168 pages.
- 3031 or 3032 Processor: Block multiplexer channels (five are standard); the 3031 and 3032 require EC 279679 to operate with the 3800 model 3. See M3031 and 3032 pages.
- 3033 Processor: On models U, A, and M block multiplexer channels (ten are standard); on Model Group N block multiplexer channels (five are standard, five are optional); on Model Group S block multiplexer channel (five are standard); the 3033 requires EC 279679 to operate with the 3800 model 3. See M3033 pages.
- 3081 Processor: Block multiplexer channels (up to 24 possible, 20 if 4 byte multiplexer channels are installed) -- the 3081 requires system EC 213971 (including microcode EC 214788) to operate with the 3800 model 3; see M3081 pages.
- 3083 Processor: Block multiplexer channels (up to 24 possible, 20 if 4 byte multiplexer channels are installed); see M3083 pages.
- 3084 Processor: Block multiplexer channels (up to 24 possible per side, 20 if 4 byte multiplexer channels are installed); see M3084 pages.
- 3090 model 200 Processor: Block multiplexer channels (up to 48 possible, 44 if 4 byte multiplexer channels are installed; see M3090 model 200 pages.
- 3090 model 400 Processor: Block multiplexer channels (up to 48 per side, 44 if 4 byte multiplexer channels are installed; see M3090 model 400 pages.
- 4300 Processor: Block multiplexer channel; see M4341, 4361, 4381 pages.
- 9370 Processor: Block multiplexer channel; see M9373, 9375, 9377 pages.

### HIGHLIGHTS

The 3800 model 3 offers new printing functions and improved print density with 240x240 picture elements (pels) per square inch, a 2.2 times improvement over the 3800 model 1. There are two modes of operation - Compatibility mode which prints 3800 model 1 applications with a minimum of change to the application - and "all-points-addressable" mode which prints complex pages for image, text, graphics, and system printing applications. All-points-addressable mode is also called Page mode.

The model 3 prints on single part continuous forms and is equipped for either of two paper size standards: The Common Use Option which supports 50 discrete paper sizes or the ISO Option which supports 78 discrete paper sizes. Printing is repeated for multiple copies and every copy is "original" quality.

Printing throughput can vary depending on form length, number of copies needed, and functions exercised. Throughput of up to 20,040 lines per minute can be achieved -- see accompanying table.

**Print Speed Range:** The following speeds apply to the 3800 model 3 in Compatibility mode. The number of characters per line depends upon the form width being used. The speeds shown for 12 lpi are applicable when a maximum of 190 characters, including blanks, are printed on each line.

#### Common Use Option

Forms	Forms	Lines Per Minute *			
		Per	6 lpi	8 lpi	10 lpi 12 lpi
Lngh	Min.	Up to:	Up to:	Up to:	Up to:
(in.)	Up to:	Up to:	Up to:	Up to:	Up to:
3-1/2	526	7,890	10,520	13,150	15,780
5-1/2	334	9,018	12,024	15,030	18,036
7	263	9,468	12,624	15,780	18,936
8-1/2	215	9,675	12,900	16,125	19,350
11	167	10,020	13,360	16,700	20,040

#### ISO Option

Forms	Forms	Lines Per Minute *			
		Per	6 lpi	8 lpi	10 lpi 12 lpi
Lngh	Min.	Up to:	Up to:	Up to:	Up to:
(in.)	Up to:	Up to:	Up to:	Up to:	Up to:
3	597	7,164	9,552	11,940	14,328
4	454	8,172	10,896	13,620	16,344
6	286	8,580	11,440	14,300	17,160
8	215	9,030	12,040	15,050	18,060
10	167	9,018	12,024	15,030	18,036
12	143	9,438	12,584	15,730	18,876

\* Single copy speeds

**Compatibility Mode:** When operating in Compatibility mode the model 3 can perform the functions of the 3800 model 1, plus print at 10 lines per inch. This provides for easy migration of 3800 model 1 applications.

**Note:** The model 3 does not have a Tape-to-Printing Subsystem feature which is available for the 3800 model 1.

In Compatibility Mode the 3800 model 1 electronic character generation is emulated, providing 255 WCGM storage positions, organized in four 64-character Writeable Character Generation Modules (WCGM). Character sets are program selected without operator

intervention and dynamically loaded into hardware WCGMs. Dynamic storage allows character substitution under program control. Customers may design their own characters. The following standard 3800 model 1 character sets are provided with Data Facility Device Support Release 1.6 for 240x240 pel printing:

### Character Sets Standard:

Character Style	Pitch (cpi)			Special Underscored
	10	12	15	
Gothic	X	X	X	Yes
Gothic 15 Condensed	X			Yes
Text 1 (Upper Case)	X			Yes
Text 2 (Lower Case)	X			Yes
OCR A	X			
OCR B	X			
Format	X	X	X	
Katakana	X	X	X	

**Note:** Includes World Trade National Use Graphics.

The 16 fonts provided with Document Composition Facility (5748-XX9), Release 2, are also provided in 240x240 pel form. Twenty-three fonts from the 6670 have been prepared for use with the 3800 model 3 in Compatibility mode. These characters were originally designed for 240x240 pel printing.

Customers can convert existing customer-created 3800 model 1 character sets or create new characters in the 240x240 pel density -- see Character Conversion Aid announcement letter.

**All-Points-Addressable Mode:** This mode is supported by Print Services Facility (5665-275), Print Management Facility (5665-307) and Overlay Generation Language (5665-308). Also, see Document Composition Facility (5748-XX9) and Graphical Data Display Manager (5748-XXH). Compatibility mode is also supported by MVS/370 Data Facility Product Release 1.1 (5665-295), MVS/XA Data Facility Product Version 1 Release 1.2 (5665-284), or MVS/XA Data Facility Product Version 2 Release 1.0 (5665-XA2).

**New Printer Commands:** Characters can be positioned at any defined point on the printable area of the page. Alphameric text can be generated in three orientations (one horizontal and two vertical). Proportional-spaced and fixed-space fonts ranging in size from 4 to 36 "points" can be printed. (A "point" is 1/72 inch and is a measure of character size. This should not be confused with a printable raster point, also called a pel.)

With the base machine multiple fonts can be mixed within one data set. The number of fonts which can be present in the base machine depends upon the character size and the number of characters in the font. Fonts can be loaded from the host into the printer and stored on the internal diskette (with user provided programming) or in raster pattern storage.

Solid and dashed lines can be generated horizontally and vertically from any defined point in the printable area of the page for any specified length as long as the line remains within the printable area of the page.

Raster images of logos, signatures, drawings and photographs up to full-page size can be printed. The images are printed in raster form of 240x240 dots per square inch. Images in raster form of 120x120 dots per square inch are accepted. For these the printer generates four dots for each one indicated, producing a facsimile the same size as the original. The Accumulator feature (#1010) is required for images larger than those which can be held in the raster pattern storage where the image size depends on the raster pattern storage installed and the amount required for fonts. (Images cannot be printed in compatibility mode.)

Quality considerations in the printing of images are similar to those for printing a forms overlay, e.g., line widths and large dark areas. These guidelines and restrictions are presented in the "Forms De-

sign Reference Guide for the IBM 3800 Printing Subsystem", GA26-1633.

A major extension has been made to provide "electronic overlay generation". The new capabilities allow a form to be printed from a sequence of printer commands which print lines (creating boxes), constant alphameric text, shaded areas, and images for signatures, logos, etc. This information (the electronic overlay) is merged by the printer with the variable data for a given page and printed. This capability will allow many custom forms of different sizes to be printed on blank paper.

Multiple electronic overlays can be held in the base printer and used on demand within one application. The maximum addressable number is 127. The maximum for an application will depend on the complexity of the electronic overlay and the demands made by the application on the control storage. Up to eight electronic overlays can be merged onto a single page. (Dependent upon the complexity, throughput may be impacted.)

**Storage:** A control storage of 512K bytes is provided in the base printer. This provides storage for the microcode, page buffers, tables associated with character fonts, etc.; a raster pattern storage with 256K bytes is provided in the base machine for multiple character sets and for limited storage of image data. Up to 512K bytes total is available by an incremental feature of 256K bytes. Fonts are stored in raster pattern storage and the amount of storage required is a function of the character size and the number of characters in the font. A font can have a maximum of 256 characters. An Accumulator feature (#1010) may be added. It allows more complex pages to be created for printing. The first increment is 768K bytes with expansion to a total of either 1,024K bytes or 1,280K bytes.

### ADDITIONAL HIGHLIGHTS

**Note:** Some of the following highlights apply to the model 3 only when operating in compatibility mode and are so indicated.

#### ● Gothic 15

(15 characters/inch at 8 or 10 lines/inch) - 11 in. x 14-7/8 in. reports can be reduced to 8-1/2 in. x 11 in.; convenient size; increased throughput, reduced forms cost, reduced filing space by using the maximum print span of 204 positions. The application of 12 lpi vertical spacing with the Gothic 15 Condensed character set can result in a reduction in paper volume of up to about 30% beyond the savings projected in reducing page sizes by applying the 15 pitch character set at 8 lpi.

#### ● Optical Character Recognition (OCR) Printing

Alphameric OCR A and the less stylized OCR B fonts can be intermixed with non-OCR fonts with no reduction in printing throughput. Documents may be processed by the 1287, 1288, and 3886 Optical Character Readers. Refer to the appropriate pages for specific capabilities.

**Note:** The OCR-A characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the United States of America Standard Character Set for Optical Character Recognition, Size A, USAS X3.17-1977. The OCR-B characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the United States of America Standard Character Set for Optical Character Recognition, Size B, USAS X3.17-1975 and the European Computer Manufacturers Association's Standard ECMA-11 for Alphanumeric Character Set OCR-B for Optical Recognition, (EMCA 11-1975).

#### ● Text Character Set

Upper and lower case characters with serifs; special graphics; no reduction in throughput. Note: The model 3 has extensive text capabilities in the all-points-addressable mode plus the availability of some 6670 fonts which can be used in compatibility mode.

- **Format 10, 12 and 15 Pitch**  
Merge format and data; program controlled for online operation (compatibility mode only).
- **Copy Modification Function (Compatibility mode only)**  
Identify copies with legends, phrases, or names (e.g., Customer Copy, For Accounting Purposes Only, etc.); address each report copy to speed distribution; spot carbon or field blackout functions; identification and deletion program controlled. Provides customized forms with the identification, deletion and formatting functions.
- **Forms Overlay (both modes)**  
Optical image system; prints high quality document and report formats, designs or other constant data; merge format and data; program controlled.
- **Single Part Continuous Form Output**  
Including custom printed forms; no deleaving; no carbon disposal; faster job separation making use of the Mark Form function.
- **Optional Burster-Trimmed-Stacker Output**  
Eliminates bursting and deleaving bottlenecks; offset separation between data set copies; remove output while printing; first-in, first-out job sequence; trimmed edges.
- **Optional Channel Switching**  
Manual switches provide system configuration flexibility through the use of the 3814 Switching Management System, or the 2914 Manual Switch model 1 (RPQ 880882), or the Two-Channel Switch (#8180); automatic switching is provided by the Dynamic Two-Channel Switch (#8181) for two processors in a tightly coupled multiprocessing configuration, and two channels on a single CPU providing alternate path capability.
- **Laser Safety**  
The 3800 contains a laser assembly. In IBM's opinion, the 3800, including the laser assembly, is designed to comply with the safety standards of the United States Department of Health, Education and Welfare (21 CFR 1040). Separate registrations by the customer may be required by some states. A number of countries presently have, and others are considering, the adoption of regulations governing the use of laser products. The customer is responsible for determining the extent of regulations governing the use of laser products at their location.
- **Forms**  
Prints on discrete form sizes. Utilizes five form depths: 3-1/2 in., 5-1/2 in., 7 in., 8-1/2 in. and 11 in.; ten form widths measured edge to edge: 6-1/2 in., 8-1/2 in., 9-1/2 in., 9-7/8 in., 10-5/8 in., 11 in., 12 in., 12-5/8 in., 14.3 in., 14-7/8 in. which permutes to 50 discrete sizes. Common Use Option Forms are reformed in 7 in. (2 x 3-1/2), 8-1/2 in. and 11 in. (2 x 5-1/2) in lengths.  
  
The ISO Option utilizes six forms depths -- 78.2mm (3 in.), 101.6mm (4 in.), 152.4mm (6 in.), 203.2mm (8 in.), 254.0mm (10 in.), 304.8mm (12 in.) and thirteen forms widths (measured edge to edge) -- 165mm, 180mm, 215mm, 235mm, 250mm, 270mm, 280mm, 305mm, 322mm, 340mm, 363mm, 375mm and 378mm which permute into 78 discrete sizes. ISO Option forms are reformed into 6-, 8-, 10-, and 12-inch lengths. A special feature, ISO Paper Sizes, Add'l (#2743), adds form lengths of 211.6mm (8-1/3 in.) and 317.5mm (12-1/2 in.).  
  
Character and forms overlay printing are restricted from first and last 0.5 inch of forms length. The Paper Sizes, Add'l feature (#2743) allows printing within 1/3 inch of the bottom of the form. A printed line can begin a minimum of 0.5 inch from the left paper edge and cannot exceed a length to position a character nearer than 0.5 inch from the right paper edge for all widths except 14-7/8 in. in compatibility mode where the stated dimension is 0.775 inch from the right.

Paper must be from 15 lb to 24 lb basis weight. See "Forms Design Reference Guide for the IBM 3800 Printing Subsystem", (GA26-1633) for details of weight and other forms considerations. Left-hand side of form is a fixed location in the machine, print line adjustment is by electronically moving the line. First print position can move to the right 5.7 in. (compatibility mode only) but will cause an equivalent number of positions at the right end to be moved beyond the above defined print line boundaries. It is recommended that printing not occur within 0.100 in. of any binder holes or corner cuts within the form.

**Publications:** GA32-0049, GA32-0050, SH35-0051, GA26-1633, GC20-0001.

## SPECIFY

- **Power (AC, 3-phase):**

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
230V #2827	220V #2800
235V or	230V #9905
240V #2818	240V #9915
380V #2816	
400V #2825	
408V #2819	
415V #2826	
- **Color (for end cover only, machine color is cloud white):**  
#9041 for red, #9042 for yellow, #9043 for blue, or #9045 for gray.
- **Machine Nomenclature:**

English #2927	Italian #2932
French #2928	Spanish #2931
German #2929	
- **Paper Sizes: #2741 - Common Use; #2742 - ISO**  
  
Common Use Paper Sizes (#2741): Enables the 3800 to process the following forms depths and widths:  
  
Five Forms Depths (in inches): 3-1/2, 5-1/2, 7, 8-1/2, 11. Ten Forms Widths (in inches, edge to edge): 6-1/2, 8-1/2, 9-1/2, 9-7/8, 10-5/8, 11, 12, 13-5/8, 14.3, 14-7/8. Limitations: Cannot be installed with ISO Paper Sizes (#2742). Maximum: One. Field Installation: RPQ only.  
  
ISO Paper Sizes (#2742): Enables the 3800 to process the following forms depths and widths:  
  
Six Forms Depths (mm (in.)): 76.2 (3), 101.6 (4), 152.4 (6), 203.2 (8), 254.0 (10), 304.8 (12). Thirteen Forms Widths (in mm, edge to edge): 165, 180, 215, 235, 250, 270, 280, 305, 322, 340, 363, 375, 378. Limitations: Cannot be installed with Common Use Paper Sizes (#2741). Maximum: One. Field Installation: RPQ only.
- **Tool Kit: For rental or Term Lease (ICC) customer, select one:**
  1. First 3800 model 1 or 3 ordered, specify #9330 when ordering a model 3.
  2. If unit ordered is second or higher 3800 model 3 to be installed, no additional tool kit is required.
  3. If a 3800 model 1 is installed and a model 3 is ordered to supplement or replace the model 1, specify #9331 (Special Tool Group) which will bring the existing tool kit up to the level required for the model 3.
  4. If 3800 model 1 is being field converted to a model 3, specify #9331 (Special Tool Group) which will bring the existing tool kit up to the level required for the model 3.

## MACHINES

5. If required for a multiple machine installation, because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.

For purchase customer, select one:

1. For each new purchase 3800 model 3, specify #9330.
2. When rental 3800 model 3s are purchased, a tool kit (#9330) is to be ordered on a no-charge MES for each machine.
3. When a purchased model 1 is being field converted to a model 3, specify #9331 (Special Tool Group) which will bring the existing tool kit up to the level required for the model 3.

**Note:** A Tool Kit (#9220) is required with Burster-Trimmed-Stacker (#1490); see #1490 below.

## SPECIAL FEATURES

**Accumulator (#1010):** The accumulator is used to generate complex pages that require more fonts than can be held in raster pattern storage. The page can be viewed as having been created in layers (each layer associated with a set of fonts or images). The layers are "accumulated" until the complex page is complete. Images which are too large for raster pattern storage are placed in the accumulator for printing. This feature provides 768K bytes of storage which will hold data for up to 106 sq. in. of image. Maximum: One. Field Installation: Yes.

**Accumulator Expansion (#1021):** This feature adds 256K bytes of storage to the Accumulator (#1010) for a total of 1024K bytes which will hold data for up to 142 sq. in. of image. For use with Common Use Paper Sizes (#2741). Maximum: One. Field Installation: Yes. Prerequisites: #1010 and #2741.

**Accumulator Expansion, ISO (#1022):** This feature adds 512K bytes of storage to the Accumulator (#1010) for a total of 1280K bytes which will hold data for up to 178 sq. in. of image. This is only for machines that have ISO Paper Sizes (#2742) and allows printing of the largest image possible on the maximum ISO paper size. Maximum: One. Field Installation: Yes. Prerequisites: #1010 and #2742.

**Burster-Trimmed-Stacker (#1490):** Provides an additional output stacking method. Bursts the five Common Use Paper Sizes (#2741) forms lengths or the six ISO Paper Sizes (#2742) or the two ISO Paper Sizes, Additional (#2743), together with (#2905) to individual sheets and stacks sheets sequentially. Also trims left and right 0.5 inch carrier strip from output sheet. Maximum: One. Field Installation: Yes. Prerequisites: #9220. For rental customer -- specify #9220 for first Burster-Trimmed-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES. For purchase customer -- specify #9220 on each Burster-Trimmed-Stacker feature order. When installed Burster-Trimmed-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature.

**ISO Paper Sizes, Add'l (#2743):** Adds two ISO Option form lengths to the printer -- 211.6mm (8-1/3 in.) and 317.5mm (12-1/2 inches).

These lengths can be combined with any of the ISO Option form widths. The 8-1/3 in. form may consist of two 4-1/6 inch forms folded at 8-1/3 in. The 12-1/2 inch form may consist of three 4-1/6 inch forms folded at 12-1/2 in.

Printing within 1/2 or 1/3 inch of the bottom of the form is selectable by the operator. When "1/3 inch" is selected, printing will start 2/3 inch from the top of the form.

This feature corresponds to 3800 model 1 RPQs XA9753, XA9754 and YB0029. These RPQs are not available on the model 3. Paper weights and strength specifications for internal perforations are specified in the "Forms Design Reference Guide for the IBM 3800 Printing Subsystem." (GA26-1633). Limitations: These form lengths cannot be burst by the Burster-Trimmed-Stacker (#1490). This feature is not for use with the Common Use Option (#2741). These form lengths cannot be burst by the Burster-Trimmed-Stacker (#1490). In order to burst the paper sizes offered by Feature (#2743), specify ISO Paper Sizes, Add'l-BTS (#2905). Maximum: One. Field Installation: Yes. Prerequisites: #2742.

**Raster Pattern Storage, Add'l (#5410):** Base machine comes with 256K bytes, storage maximum is 512K bytes in one additional storage increment of 256K bytes. Provides font storage for multiple character sets and can be used to hold small images. Maximum: One. Field Installation: Yes.

**Remote Switch Attachment (#6158):** To attach the Two-Channel Switch (#8180) to a configuration control panel. Maximum: One. Field Installation: Yes. Prerequisites: #8180.

**Two-Channel Switch (#8180):** To attach the 3800 to two S/370, 30XX, or 4300 Processor channels which may be on the same CPU or on two different CPUs. The two interfaces can have different addresses. The two-channel switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel. Maximum: One. Field Installation: Yes.

**Dynamic Two-Channel Switch (#8181):** Provides the additional capability of an automatic two-channel switch. The switch is designed to furnish symmetric two-processor support for tightly coupled multiprocessor systems and to attach to two channels from a single CPU to provide alternate path capability. For either tightly coupled multiprocessors or single CPU attachments, data transfer occurs only one channel path at a time. Maximum: One. Field Installation: Yes. Prerequisites: #8180.

## MODEL CONVERSION

3800 model 1s which are purchased or under an ICC Term Lease can be converted to a model 3 by MES. Conversion from a 3800 model 3 to a 3800 model 1 is not available.

## ACCESSORIES (NONE)

## SUPPLIES

Contact your Country DP Supplies Coordinator.

## 3800 PRINTING SUBSYSTEM MODEL 6

### PURPOSE

Printer output unit for 3081, 3083, 3084, 3090, 4361 Model Group 5 and 4381 Processors.

The 3800 Printing Subsystem Model 6 is an intermediate speed AFP fanfold printer that uses an electro-photographic process to print up to 134 pages per minute. The 3800 Printing Subsystem Model 6 provides printing with a density of 240x240 dots (pels) per square inch. There are two modes of operation: Compatibility Mode which prints 3800 Model 1 applications with a minimum of change to the application program and Advanced Function Printing mode which prints complex pages of image, text, graphics, and system printing applications.

**Note:** Operating System support for the model 6 is provided under MVS/370, MVS/XA, VM/SP, VM/SP HPO, VSE/SP, and VSE/AF.

### MODEL 6

#### Model 6 006

**Prerequisites:** A control unit position on a system channel is required.

**Note:** The model 6 does not provide for attachment to a byte multiplexer channel.

#### Processor Attachment

- 3081 Processor: Block multiplexer channels (up to 24 possible, 20 if 4-byte multiplexer channels are installed) – the 3081 requires system EC 213971 (including microcode EC 214788) to operate with the 3800 model 6; see M3081 pages.
- 3083 Processor: Block multiplexer channels (up to 24 possible, 20 if 4-byte multiplexer channels are installed); see M3083 pages.
- 3084 Processor: Block multiplexer channels (up to 24 possible per side, 20 if 4-byte multiplexer channels are installed); see M3084 pages.
- 3090 model 150 Processor: Block multiplexer channels (up to 24 possible, 16 standard and eight optional; see M3090 model 150 pages.
- 3090 model 180 Processor: Block multiplexer channels (up to 32 possible, 16 standard and 16 optional; see M3090 model 180 pages.
- 3090 model 200 Processor: Block multiplexer channels (up to 48 possible, 44 if 4-byte multiplexer channels are installed; see M3090 model 200 pages.
- 3090 model 400 Processor: Block multiplexer channels (up to 48 per side, 44 if 4-byte multiplexer channels are installed; see M3090 model 400 pages.
- 4300 Processor: Block multiplexer channel; M4361, 4381 pages.
- 9370 Processor: Block multiplexer channel; see M9373, 9375, 9377 pages.

### HIGHLIGHTS

The 3800 Printing Subsystem Model 6 can be ordered as follows:

- Base Unit: IBM covers and a single channel attachment which can operate in either DCI or data streaming mode.

- Base Unit with the 3810 Feature which includes: a two-channel switch, accumulator (and expansion), and 512K bytes of raster pattern storage.
  - Base Unit with any of the 3800 Model 3 Features.
- Note:** This option will have a longer delivery schedule than the first two.
- The Double Byte Character Set Font Storage RPQ (8A5008) can be requested with any of the above configurations.

This RPQ supports double-byte character set font sizes from 22x22 pels to 64x64 pels.

All the 3800 Model 3 features are available for field install on the 3800 Printing Subsystem Model 6, and all RPQs will be evaluated on an individual basis. (Note: Feature 3810 will not be provided as a field installed MES).

The 3800 Printing Subsystem Model 6 will appear to the S/370 software interface as a 3800 Printing Subsystem Model 3 or 8, and thus require no software changes. The customer must define the 3800 Printing Subsystem Model 6 as a 3800 Printing Subsystem Model 3 or 8 to the system.

The model 6 prints on single part continuous forms. The common paper sizes are provided in 50 discrete paper sizes. ISO machines are equipped to support 78 or 104 discrete paper sizes depending on the specify options selected. Printing is repeated for multiple copies and every copy is "original" quality.

Printing throughput can vary depending on form length, number of copies needed, and functions exercised. Throughput of up to 12,480 lines per minute can be achieved (see accompanying table).

**Print Speed Range:** The following speeds apply to the 3800 model 6 in Compatibility mode. The number of characters per line depends upon the form width being used. The speeds shown for 12 lpi are applicable when a maximum of 190 characters, including blanks, are printed on each line.

#### Common Use Option

Forms		Lines Per Minute *				
Lngth (in.)	Per Min.	6 lpi	8 lpi	10 lpi	12 lpi	
	Up To:	Up to:	Up to:	Up to:	Up to:	
3-1/2	328	4,920	6,560	8,220	9,840	
5-1/2	208	5,616	7,488	9,360	11,232	
7	164	5,904	7,872	9,840	11,808	
8-1/2	134	6,030	8,040	10,050	12,060	
11	104	6,240	8,320	10,400	12,480	

\* Single copy speeds

#### ISO Option

Forms		Lines Per Minute*				
Lngth (in.)	Per Min.	6 lpi	8 lpi	10 lpi	12 lpi	
	Up to:	Up to:	Up to:	Up to:	Up to:	
3	373	4,476	5,968	7,460	8,952	
4	283	5,094	6,792	8,490	10,188	
4-1/6	268	5,091	6,789	8,496	10,183	
6	178	5,340	7,120	8,900	10,680	
8	134	5,620	7,504	9,380	11,256	
8-1/3	134	5,620	7,504	9,380	11,256	
10	104	5,616	7,488	9,360	11,232	

12 89 5,874 7,832 9,790 11,748  
12-1/2 89 5,874 7,832 9,790 11,748

\* Single copy speeds.

**Note:** 8 1/3 and 12 1/2 lengths are available only by specifying option #2744.

**Compatibility Mode:** When operating in Compatibility mode the model 6 can perform the functions of the 3800 model 1, plus print at 10 lines per inch. This provides for easy migration of 3800 model 1 applications.

**Note:** The model 6 does not have a Tape-to-Printing Subsystem feature which is available for the 3800 model 1.

In Compatibility Mode the 3800 model 1 electronic character generation is emulated, providing 255 WCGM storage positions, organized in four 64-character Writeable Character Generation Modules (WCGM). Character sets are program selected without operator intervention and dynamically loaded into hardware WCGMs. Dynamic storage allows character substitution under program control. Customers may design their own characters. The following standard 3800 model 1 character sets are provided with Data Facility Product for 240x240 pel printing:

#### Character Sets Standard

Character Style	Pitch (cpi)			Special Underscored
	10	12	15	
Gothic	X	X	X	Yes
Gothic 15 Condensed	X			Yes
Text 1 (Upper Case)	X			Yes
Text 2 (Lower Case)	X			Yes
OCR A	X			
OCR B	X			
Format	X	X	X	
Katakana	X	X	X	

**Note:** Includes World Trade National Use Graphics. Twenty-three fonts from the 6670 have been prepared for use with the 3800 model 6 in Compatibility mode. These characters were originally designed for 240x240 pel printing.

**All-Points-Addressable Mode:** This mode is supported by Print Services Facility (5665-275), Print Management Facility (5665-307) and Overlay Generation Language (5665-308). Also, see Document Composition Facility (5748-XX9) and Graphical Data Display Manager (5748-XXH). Compatibility mode is also supported by:

- MVS/370:
  - MVS/SP-JES2 Version 1 Release 3.3 or later
  - MVS/SP-JES3 Version 1 Release 3.1 or later
  - MVS/370 Data Facility Product Release 1.0 or later
- MVS/XA:
  - MVS/SP-JES2 Version 2 Release 1.2 or later
  - MVS/SP-JES3 Version 2 Release 1.2 or later
  - MVS/XA Data Facility Product Release 1.2 or later
- VM:
  - VM/System Product (VM/SP) Release 3
  - VM/SP High Performance Option (HPO) Release 3.2

**Printer Commands:** Characters can be positioned at any defined point on the printable area of the page. Alphameric text can be generated in three orientations (one horizontal and two vertical). Proportional-spaced and fixed-space fonts ranging in size from 4 to 36 "points" can be printed. (A "point" is 1/72 inch and is a measure of character size. This should not be confused with a printable raster point, also called a pel.)

With the base machine multiple fonts can be mixed within one data set. The number of fonts which can be present in the base machine depends upon the character size and the number of characters in the font.

Solid and dashed lines can be generated horizontally and vertically from any defined point in the printable area of the page for any specified length as long as the line remains within the printable area of the page.

Raster images of logos, signatures, drawings and photographs up to full-page size can be printed. The images are printed in raster form of 240x240 dots per square inch. Images in raster form of 120x120 dots per square inch are accepted. For these the printer generates four dots for each one indicated, producing a facsimile the same size as the original. The Accumulator feature (#1010) is required for images larger than those which can be held in the raster pattern storage where the image size depends on the raster pattern storage installed and the amount required for fonts. (Images cannot be printed in compatibility mode.)

Quality considerations in the printing of images are similar to those for printing a forms overlay, e.g., line widths and large dark areas. These guidelines and restrictions are presented in the "Forms Design Reference Guide for the IBM 3800 Printing Subsystem", GA26-1633.

A major extension has been made to provide "electronic overlay generation". The new capabilities allow a form to be printed from a sequence of printer commands which print lines (creating boxes), constant alphameric text, shaded areas, and images for signatures, logos, etc. This information (the electronic overlay) is merged by the printer with the variable data for a given page and printed. This capability will allow many custom forms of different sizes to be printed on blank paper.

Multiple electronic overlays can be held in the base printer and used on demand within one application. The maximum addressable number is 127. The maximum for an application will depend on the complexity of the electronic overlay and the demands made by the application on the control storage. Up to eight electronic overlays can be merged onto a single page. (Depending upon the complexity, throughput may be impacted.)

**Double Byte Character Set Font Storage RPQ (8A5008) - (DBCS):** The DBCS capability is designed to provide character sets with more than 256 characters. The characters are addressed by a two-byte code. The 3800 model 6 will support approximately 22,500 two-byte characters when the Double Byte Character Set Font Storage RPQ is installed on it.

The minimum character size is 22x22 pels while the maximum character size is 64x64 pels, approximately one-quarter inch or 6.77mm square.

This capability applies to ideographic language characters such as Japanese, Chinese, Korean, etc. Characters from different languages can be printed at the same time. DBCS characters of different sizes can be intermixed on the same line as can one-byte characters. DBCS character sets may be intermixed with one-byte character sets, for example, English, German, etc.

A total of 64 character sets can be in the printer, provided the storage space is available. This includes the combination of one- and two-byte character sets and the three default character sets which reside in the printer. DBCS characters are stored in a compressed form which is automatically decompressed by the printer at printing time.

**Note:** The DBCS capability operates only in the all-points-addressable mode.

**Storage:** A control storage of 512K bytes is provided in the base printer. This provides storage for the microcode, page buffers, tables associated with character fonts, etc.; a raster pattern storage with 256K bytes is provided in the base machine for multiple character sets and for limited storage of image data. Up to 512K bytes total is available by an incremental feature of 256K bytes or as a part of feature 3810 as mentioned in "Highlights". Fonts are stored in raster pattern storage and the amount of storage required is a function of the character size and the number of characters in the

font. A font can have a maximum of 256 characters. An Accumulator feature (#1010) may be added (or as part of #3810). It provides 768K bytes additional accumulator storage allowing more complex pages to be created for printing on a limited number of Common and ISO paper sizes. This accumulator storage may be increased by either (not both) one of the following expansion features:

- The Accumulator Common Expansion (#1021) may be added (or as part of #3810) providing an additional increment of 256K bytes for a total of 1024K bytes additional accumulator storage and support to all Common paper sizes and an expanded number of ISO paper sizes.
- The Accumulator ISO Expansion (#1022) may be added providing an additional increment of 512K bytes for a total of 1280K bytes additional accumulator storage and support to all Common paper sizes and ISO paper sizes (up to a 14 7/8 x 12-inch page).

The first increment is 768K bytes with common machines having one more increment of 256K bytes, for a total of 1K bytes (or as part of 3810). ISO machines have expansions to a total of either 1,024K bytes or 1,280 bytes.

## ADDITIONAL HIGHLIGHTS

**Note:** Some of the following highlights apply to the model 6 only when operating in compatibility mode and are so indicated.

- Gothic 15  
(15 characters/inch at 8 or 10 lines/inch) - 11 in. x 14-7/8 in. reports can be reduced to 8-1/2 in. x 11 in.; convenient size; increased throughput, reduced forms cost, reduced filing space by using the maximum print span of 204 positions. The application of 12 lpi vertical spacing with the Gothic 15 Condensed character set can result in a reduction in paper volume of up to about 30% beyond the savings projected in reducing page sizes by applying the 15 pitch character set at 8 lpi.
- Optical Character Recognition (OCR): Printing the 3800 Printing Subsystem Model 6 can be used for OCR applications.
  - Due to variability of OCR applications and readers, IBM advises that the customer evaluate the 3800 Printing Subsystem Model 6 OCR output in their application environment.
  - Particular care should be taken when transferring OCR applications from the IBM Printing Subsystem Model 3 to the IBM Printing Subsystem Model 6. Variations in print density and resolution should be thoroughly tested for reading compatibility before committing his OCR applications to the IBM 3800 Printing Subsystem Model 6.

The following are the paragraphs describing the OCR fonts and their usage on the 3800 Model 6:

Alphanumeric OCR A and the less stylized OCR B fonts can be intermixed with non-OCR fonts with no reduction in printing throughput. Documents may be processed by the 1287, 1288, 3762 and 3886 Optical Character Readers. Refer to the appropriate pages for specific capabilities.

**Note:** The OCR-A characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the United States of America Standard Character Set for Optical Character Recognition, Size A, USAS X3.17-1977. The OCR-B characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the United States of America Standard Character Set for Optical Character Recognition, Size B, USAS X3.17-1975 and the European Computer Manufacturers Association's Standard ECMA-11 for Alphanumeric Character Set OCR-B for Optical Recognition, (EMCA 11-1975).

- Text Character Set

Upper and lower case characters with serifs; special graphics; no reduction in throughput.

**Note:** The model 6 has extensive text capabilities in the all-points-addressable mode plus the availability of some 6670 fonts which can be used in compatibility mode.

- Format 10, 12 and 15 Pitch  
Merge format and data; program controlled for on-line operation (compatibility mode only).
- Copy Modification Function (Compatibility mode only)  
Identify copies with legends, phrases, or names (e.g., Customer Copy, For Accounting Purposes Only, etc.); address each report copy to speed distribution; spot carbon or field blackout functions; identification and deletion program controlled. Provides customized forms with the identification, deletion and formatting functions.
- Forms Overlay (both modes)  
Optical image system; prints high quality document and report formats, designs or other constant data; merge format and data; program controlled.
- Single Part Continuous Form Output  
Including custom printed forms; no deleaving; no carbon disposal; faster job separation making use of the Mark Form function.

- Optional Channel Switching

Manual switches provide system configuration flexibility through the use of the 3814 Switching Management System, or the 2914 Manual Switch model 1 (RPQ 880882), or the Two-Channel Switch (#8180); automatic switching is provided by the Dynamic Two-Channel Switch (#8181) for two processors in a tightly coupled multiprocessing configuration, and two channels on a single CPU providing alternate path capability.

- Laser Safety

A number of countries presently have, and others are considering, the adoption of regulations governing the use of laser products. The customer is responsible for determining the extent of regulations governing the use of laser products at their location.

- Forms

Prints on discrete form sizes. Utilizes five form depths: 3-1/2 in., 5-1/2 in., 7 in., 8-1/2 in. and 11 in.; ten form widths measured edge to edge: 6-1/2 in., 8-1/2 in., 9-1/2 in., 9-7/8 in., 10-5/8 in., 11 in., 12 in., 12-5/8 in., 14.3 in., 14-7/8 in. which permutes to 50 discrete sizes. Common Use Option Forms are refolded in 7 in. (2 x 3-1/2), 8-1/2 in. and 11 in. (2 x 5-1/2) in lengths. The ISO machines utilize six forms depths -- 78.2mm (3 in.), 101.6mm (4 in.), 152.4mm (6 in.), 203.2mm (8 in.), 254.0mm (10 in.), 304.8mm (12 in.), and thirteen forms widths (measured edge to edge) -- 165mm, 180mm, 215mm, 235mm, 250mm, 270mm, 280mm, 305mm, 322mm, 340mm, 363mm, 375mm and 378mm which permute into 104 discrete sizes. Forms are refolded into 6-, 8-, 10-, and 12-inch lengths.

Character and forms overlay printing are restricted from first and last 0.5 inch of forms length. A printed line can begin a minimum of 0.5 inch from the left paper edge and cannot exceed a length to position a character nearer than 0.5 inch from the right paper edge for all widths except 14-7/8 in. in compatibility mode where the stated dimension is 0.775 inch from the right.

Paper must be from 15 lb to 24 lb basis weight. See "Forms Design Reference Guide for the IBM 3800 Printing Subsystem", (GA26-1633) for details of weight and other forms considerations. Left-hand side of form is a fixed location in the machine, print line adjustment is by electronically moving the line. First print position can move to the right 5.7 in. (compatibility mode only) but will cause an equivalent number of po-

sitions at the right end to be moved beyond the above defined print line boundaries. It is recommended that printing not occur within 0.100 in. of any binder holes or corner cuts within the form.

**Publications:** GA32-0049, GA32-0050, SH35-0051, GA26-1633, GC20-0001.

## SPECIFY

### ● Power (AC, 3-phase):

50 Hz		60 Hz	
200V	#2807	208V	#9903
220V	#2815	220V	#2800
230V	#2827	230V	#9905
235V	or	240V	#9915
240V	#2818		
380V	#2816		
400V	#2825		
408V	#2819		
415V	#2826		

### ● Color (for end cover only, machine color is cloud white): #9041 for red, #9042 for yellow cover, #9043 for blue, and #9045 for gray.

### ● Machine Nomenclature:

English	#2927	Italian	#2932
French	#2928	Spanish	#2931
German	#2929		

### ● Paper Sizes: #2741 - Common Use; #2742 - ISO

- Common Use Paper Sizes (#2741): Enables the 3800 to process the following forms depths and widths:

Five Forms Depths (in inches): 3-1/2, 5-1/2, 7, 8-1/2, 11. Ten Forms Widths (in inches, edge to edge): 6-1/2, 8-1/2, 9-1/2, 9-7/8, 10-5/8, 11, 12, 13-5/8, 14.3, 14-7/8. Limitations: Cannot be installed with ISO Paper Sizes (#2742) or extended ISO paper sizes (#2744). Maximum: One. Field Installation: RPQ only.

- Sizes (#2742): Enables the 3800 to process the following forms depths and widths:

Six Forms Depths (mm (in.)): 76.2 (3), 101.6 (4), 152.4 (6), 203.2 (8), 254.0 (10), 304.8 (12). Thirteen Forms Widths (in mm, edge to edge): 165, 180, 215, 235, 250, 270, 280, 305, 322, 340, 363, 375, 378. Limitations: Cannot be installed with Common Use Paper Sizes (#2741) or extended ISO paper sizes (#2744). Maximum: One. Field Installation: RPQ only.

### ● Tool Kit:

For rental or term lease (ICC) customer, select one:

- First 3800 Model 6, specify #9330 when ordering a Model 6.
- If unit ordered is second 3800 Model 6 to be installed, no additional tool kit is required.
- If required for a multiple machine installation, because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.

For purchase customer, select one:

- For each new purchase 3800 Model 6, specify #9330.

- When rental 3800 Model 6s are purchased, a tool kit (#9330) is to be ordered on a no-charge MES for each machine.

**Note:** A Tool Kit (#9220) is required with Burster-Trimmed-Stacker (#1490); see #1490 below.

## SPECIAL AND STANDARD FEATURES

**Accumulator (#1010) (Special):** The accumulator is used to generate complex pages that cannot be built in writable control store or that use images that are too large to fit in raster pattern storage. The page can be viewed as having been created in layers (each layer associated with a set of fonts or images). The layers are "accumulated" until the complex page is complete. Images which are too large for raster pattern storage are placed in the accumulator for printing. This feature provides 768K bytes of storage which will hold data for up to 106 sq. in. of image. Maximum: One. Field Installation: Yes.

**Accumulator Expansion (#1021) - (Special):** This feature adds 256K bytes of storage to the Accumulator (#1010) for a total of 1024K bytes which will hold data for up to 142 sq. in. of image. For use with Common Use Paper Sizes (#2741). Maximum: One. Field Installation: Yes. Prerequisites: #1010 and #2741.

**Accumulator Expansion, ISO (#1022) - (Special):** This feature adds 512K bytes of storage to the Accumulator (#1010) for a total of 1280K bytes which will hold data for up to 178 sq. in. of image. This is only for machines that have ISO paper sizes (#2742) or (#2744) and allows printing of the largest image possible on the maximum ISO paper size. Maximum: One. Field Installation: Yes. Prerequisites: #1010 and #2742 or #2744.

**Burster-Trimmed-Stacker (#1490) (Special):** Provides an additional output stacking method. Bursts the five common Paper Sizes (#2741) or the six ISO paper sizes of (#2742) or the eight paper sizes of (#2744) together with (#2905) (if the customer bursts 8 1/3 or 12 1/2 inch forms) to individual sheets and stacks sheets sequentially. Also trims left and right 0.5 inch carrier strip from output sheet. Maximum: One. Field Installation: Yes. Prerequisites: #9220. For rental customer -- specify #9220 for first Burster-Trimmed-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES. For purchase customer -- specify #9220 on each Burster-Trimmed-Stacker feature order. When installed Burster-Trimmed-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature. Maximum: One. Field Installation: Yes.

**ISO Paper Sizes, Additional - BTS (#2905) (Special):** Provides bursting capabilities for the eight form sizes provided in extended ISO Paper Sizes (#2744). Limitations: Cannot be used with Common Paper Sizes (#2741) or ISO Paper Sizes (#2742). Maximum: One. Prerequisites: #2744 and #1490. Field Installation: Yes.

**Expansion - Common (#3810) - (Special):** The feature offers the following features in one package:

1. Accumulator (#1010)
2. Accumulator Expansion (#1021 or #1022)
3. Raster Pattern Store Additional (#5410)
4. Two Channel Switch (#8180)

Maximum: One. Field Installation: No.

**Raster Pattern Storage, Additional (#5410) (Special):** Base machine comes with 256K bytes, storage maximum is 512K bytes in one additional storage increment of 256K bytes. Provides font storage for multiple character sets and can be used to hold small images. Maximum: One. Field Installation: Yes.

**Remote Switch Attachment (#6158) (Special):** To attach the Two-Channel Switch (#8180) to a configuration control panel. Maximum: One. Field Installation: Yes. Prerequisites: #8180 or #3810.

## MACHINES

**Two-Channel Switch (#8180) (Special):** To attach the 3800 to two S/370, 308X, 3090, or 4300 Processor channels which may be on the same CPU or on two different CPUs. The two interfaces can have different addresses. The two-channel switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel. Maximum: One. Field Installation: Yes.

**Dynamic Two-Channel Switch (#8181) (Special):** Provides the additional capability of an automatic two-channel switch. The switch is designed to furnish symmetric two-processor support for tightly coupled multiprocessor systems and to attach to two channels from a single CPU to provide alternate path capability. For either tightly coupled multiprocessors or single CPU attachments, data transfer occurs only one channel path at a time. Maximum: One. Field Installation: Yes. Prerequisites: #8180 or 3810.

**(APG only) > Double Byte Character Set Font Storage RPQ (8A5008):** Provides for character sets with more than 256 characters. The characters are addressed by a two-byte code. The 3800 model 6 will support approximately 22,500 two-byte characters when the Double

Byte Character Set Font Storage RPQ is installed on it. The maximum character size is 64x64 pels, approximately one-quarter inch or 6.77mm square. Maximum: One. Field Installation: No. Prerequisites: None <)

## MODEL CONVERSIONS

A 3800 model 6 which is purchased or under an ICC Term Lease can be converted to a model 3 by MES (available at a later date). Conversion from a 3800 model 3 to a 3800 model 6 is not available.

## ACCESSORIES (NONE)

## SUPPLIES

Contact your Country DP Supplies Coordinator.

## 3800 PRINTING SUBSYSTEM MODEL 8

### PURPOSE

Printer output unit for S/370 models 158, 168, and the 3031, 3032, 3033, 3081, 3083, 3084, 3090, 4341, 4361 Model Group 5, and 4381 Processors.

### MODEL 8

#### Model 8 008

**Limitations:** Operating System support for the model 8 is provided only under MVS/370 and MVS/XA.

**Prerequisites:** A control unit position on a system channel is required.

**Note:** The model 8 does not provide for attachment to a byte multiplexer channel.

#### Processor Attachment:

- S/370 model 158: Block Multiplexer Channels (first two are standard). The model 158-1 requires EC 278240 to operate with the 3800 model 8. The model 158-3 requires EC 278249 to operate with the 3800 model 8. See M3158, 3158-3 pages.
- S/370 model 168: Selector channel of 2860, Selector Sub-channel (special feature) of 2870, shared or non-shared sub-channel of 2880; see M2860, 2870, 2880 pages. Selector channel attachment is not recommended unless dedicated to the printer; see M3168 pages.
- 3031 or 3032 Processor: Block multiplexer channels (five are standard); the 3031 and 3032 require EC#279679 to operate with the 3800 model 8. See M3031 and 3032 pages.
- 3033 Processor: On models U,A, and M block multiplexer channels (ten are standard); On model Group N block multiplexer channels (five are standard, five are optional); On model Group S block multiplexer channel (five are standard). The 3033 requires EC#279679 to operate with the 3800 model 8. See M3033 pages.
- 3081 Processor: Block multiplexer channels (up to 24 possible, 20 if 4 byte multiplexer channels are installed); the 3081 requires system EC#213971 (including microcode EC#214788) to operate with the 3800 model 8; see M3081 pages.
- 3083 Processor: Block multiplexer channels (up to 24 possible, 20 if 4 byte multiplexer channels are installed); see M3083 pages.
- 3084 Processor: Block multiplexer channels (up to 24 possible per side, 20 if 4 byte multiplexer channels are installed); see M3084 pages.
- 3090 model 200 Processor: Block multiplexer channels (up to 48 possible, 44 if 4 byte multiplexer channels are installed); see M3090 model 200 pages.
- 3090 model 400 Processor: Block multiplexer channels (up to 48 per side, 44 if 4 byte multiplexer channels are installed); see M3090 model 400 pages.
- 4300 Processor: Block multiplexer channel; see M4341, 4361, 4381 pages.
- 9370 Processor: Block multiplexer channel; see M9373, 9375, 9377 pages.

### HIGHLIGHTS

The 3800 model 8 provides --- printing with density of 240 x 240 dots per square inch at up to 20,040 lines per minute --- Extended

Graphics capability which allows printing of up to 11,970 unique characters in a single character set --- approximately 22,500 Extended Graphics characters can be held in the printer.

The 3800 model 8 prints on single-part continuous forms --- equipped for either of two paper size standards: The Common Use option, which supports 50 discrete paper sizes or the ISO option, which supports 78 discrete paper sizes. Printing is repeated for multiple copies, and every copy is of "original" quality.

There are two modes of operation --- compatibility mode which prints 3800 model 1 applications with a minimum of change to the application and "all-points-addressable" mode which prints complex pages for image, text, graphics and system printing applications. All-points-addressable mode is also called Page mode.

**Compatibility Mode:** When operating in compatibility mode the model 8 can perform the functions of the 3800 model 1 plus print at 10 lines per inch. This provides for easy migration of 3800 model 1 applications. Compatibility mode is supported by MVS/370 Data Facility Product Release 1.1 (5665-295), MVS/XA Data Facility Product Version 1 Release 1.2 (5665-284), MVS/XA Data Facility Product Version 2 Release 1.0 (5665-XA2) and Data Facility Device Support Release 1.6 (5740-AM7).

In Compatibility Mode the 3800 model 1 electronic character generation is emulated, providing 255 WCGM storage positions, organized in four 64 character Writeable Character Generation Modules (WCGM). Character sets are program selected without operator intervention and dynamically loaded into hardware WCGMs. Dynamic storage allows character substitution under program control. Customers may design their own characters. The following standard 3800 model 1 character sets are provided with MVS/370 Data Facility Product Release 1.1 (5665-295), MVS/XA Data Facility Product Version 1 Release 1.2 (5665-284), MVS/XA Data Facility Product Version 2 Release 1.0 (5665-XA2) and Data Facility Device Support Release 1.6 (5740-AM7) for 240 x 240 pel printing:

Character Sets	Standard			Special Underscored
	Pitch (cpi)	10	12	15
Gothic	X	X	X	Yes
Gothic 15				
Condensed			X	Yes
Text 1 (Upper Case)	X			Yes
Text 2 (Lower Case)	X			Yes
OCR A	X			
OCR B	X			
Format	X	X	X	
Katakana	X	X	X	

**Note:** Includes World Trade National Use Graphics.

The 16 fonts provided with Document Composition Facility (5748-XX9), Release 2, are also provided in 240 x 240 pel form. Twenty-three fonts from the 6670 have been prepared for use with the 3800 model 8 in compatibility mode. These characters were originally designed for 240 x 240 pel printing.

Customers can convert existing customer-created 3800 model 1 character sets or create new characters in the 240x240 pel density - see Print Management Facility (5665-307) or Character Conversion Aid (5665-299) pages.

Printing throughput can vary depending on form length, number of copies needed, and functions exercised.

**Note:** Compatibility mode emulates the 3800 model 1. There is no emulation of the 3800 model 2. Also, the model 8 does not have a Tape-to-Printing Subsystem feature which is available for the 3800 model 1.

**Print Speed Range:** The following speeds apply to the 3800 model 8 in compatibility mode. The number of characters per line depends upon the form width being used. The speeds shown for 12 lpi are applicable when a maximum of 190 characters, including blanks, are printed on each line.

### Common Use Option

Forms	Forms	Lines Per Minute *			
Lngh	Per	6 lpi	8 lpi	10 lpi	12 lpi
(in.)	Up To:	Up to:	Up to:	Up to:	Up to:
3-1/2	526	7,890	10,520	13,150	15,780
5-1/2	334	9,018	12,024	15,030	18,036
7	263	9,468	12,624	15,780	18,936
8-1/2	215	9,675	12,900	16,125	19,350
11	167	10,020	13,360	16,700	20,040

### ISO Option

Forms	Forms	Lines Per Minute *			
Lngh	Per	6 lpi	8 lpi	10 lpi	12 lpi
(in.)	Up To:	Up to:	Up to:	Up to:	Up to:
3	597	7,164	9,552	11,940	14,328
4	454	8,172	10,896	13,620	16,344
6	286	8,580	11,440	14,300	17,160
8	215	9,030	12,040	15,050	18,060
10	167	9,018	12,024	15,030	18,036
12	143	9,438	12,584	15,730	18,876

\* Single copy speeds

**All-Points-Addressable Mode:** This mode is supported by Print Services Facility (5665-275), Print Management Facility (5665-307) and Overlay Generation Language (5665-308). Also, see Document Composition Facility (5748-XX9) and Graphical Data Display Manager (5748-XXH). Compatibility mode is also supported by MVS/370 Data Facility Product Release 1.1 (5665-295) and MVS/XA Data Facility Product Release 1.2 (5665-284).

New printer commands provide the following functions: Characters can be positioned at any defined point on the printable area of the page. Alphameric text can be generated in three orientations (one horizontal and two vertical). Proportional-spaced and fixed-space fonts ranging in size from 4 to 36 "points" can be printed. (A "point" is 1/72 inch and is a measure of character size. This should not be confused with a printable raster point, also called a Pel.)

With the base machine multiple fonts can be mixed within one data set. The number of fonts depends upon the character size and the number of characters in the font. Fonts can be loaded from the host into the printer and stored on the internal diskette (with user provided programming) or in raster pattern storage.

Solid and dashed lines can be generated horizontally and vertically from any defined point in the printable area of the page for any specified length as long as the line remains within the printable area of the page.

Raster images of logos, signatures, drawings and photographs up to full-page size can be printed. The images are printed in raster form of 240 x 240 dots per square inch. Images in raster form of 120 x 120 dots per square inch are accepted. For these the printer generates four dots for each one indicated, producing a facsimile the same size as the original. The Accumulator feature (#1010) is required for images larger than those which can be held in the raster pattern storage where the image size depends on the raster pattern storage installed and the amount required for fonts. (Images cannot be printed in Compatibility mode.)

Quality considerations in the printing of images are similar to those for printing a forms overlay, e.g., line widths and large dark areas. These guidelines and restrictions are presented in the "Forms Design Reference Guide for the IBM 3800 Printing Subsystem", GA26-1633.

A major extension has been made to provide "electronic overlay generation". The new capabilities allow a form to be printed from a sequence of printer commands which print lines (creating boxes), constant alphameric text, shaded areas, and images for signatures, logos etc. This information (the electronic overlay) is merged by the printer with the variable data for a given page and printed. This capability will allow many custom forms to be printed on blank paper.

Multiple electronic overlays can be held in the base printer and used on demand within one application. The maximum addressable number is 127. The maximum for an application will depend on the complexity of the electronic overlay and the demands made by the application on the control storage. Up to eight electronic overlays can be merged onto a single page. (Dependent upon the complexity, throughput may be impacted.)

**Extended Graphics:** The Extended Graphics capability is designed to provide character sets with more than 256 characters. The characters are addressed by a two-byte code. The 3800 model 8 supports approximately 22,500 two-byte characters. The maximum character size is 64 x 64 pels, approximately one-quarter inch or 6.77mm square.

This capability applies to ideographic language characters such as Japanese, Chinese, Korean, etc. Characters from different languages can be printed at the same time. Extended graphics characters of different sizes can be intermixed on the same line as can one-byte characters. Extended graphics character sets may be intermixed with one-byte character sets, for example, English, German, etc. The 3800 model 8 can process jobs not containing extended graphic data.

A total of 64 character sets can be in the printer, provided the storage space is available. This includes the combination of one- and two-byte character sets and the three default character sets which reside in the printer. Extended graphics characters are stored in a compressed form which is automatically decompressed by the printer at printing time.

**Note:** The extended graphic capability operates only in the all-points-addressable mode.

**Storage:** A control storage of 512K bytes is provided in the base printer. This provides storage for the microcode, page buffers, tables associated with character fonts, etc.

A raster pattern storage with 256K bytes is provided in the base machine for multiple character sets and for storage of small images. Up to 512K bytes total is available by an incremental feature of 256K bytes. One-byte character sets are stored in raster pattern storage. The amount of storage required is a function of the character size and the number of characters in the character set. A character set can have a maximum of 256 characters.

An Accumulator feature (#1010) may be added. It allows more complex pages to be printed. The first increment is 768K bytes with expansion to a total of either 1,024K bytes or 1,280K bytes. This allows printing the maximum image on the maximum form size available with the Common Use or ISO Paper Sizes, respectively.

### ADDITIONAL HIGHLIGHTS

**Note:** Some of the following highlights apply to the model 8 only when operating in compatibility mode and are so indicated.

#### ● Gothic 15

(15 characters/inch at 8 or 10 lines/inch) 11 in. x 14-7/8 in. reports can be reduced to 8-1/2" x 11"; convenient size; increased throughput, reduced forms cost, reduced filing space by using the maximum print span of 204 positions. The application of 12 lpi vertical spacing with the Gothic 15 Condensed

character set can result in a reduction in paper volume of up to about 30% beyond the savings projected in reducing page sizes by applying the 15 pitch character set at 8 lpi.

- Optical Character

Recognition (OCR) Printing alphanumeric OCR A and the less stylized OCR B characters can be intermixed with non-OCR characters with no reduction in printing throughput. Documents may be processed by the 1287, 1288, 3762 and 3886 Optical Character Readers. Refer to the appropriate sales manual pages for specific capabilities.

**Note:** The OCR-A characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the "United States of America Standard Character Set for Optical Character Recognition, Size A, USAS X3.17-1977". The OCR-B characters are designed to be representative of (but not always identical to) the mean character (shape) centerline described in the "United States of America Standard Character Set for Optical Character Recognition, Size B, USAS X3.17-1975" and the "European Computer Manufacturers Association's Standard ECMA-11 for Alphanumeric Character Set OCR-B for Optical Recognition" (EMCA 11-1975).

- Copy Modification

Function (Compatibility mode) identify copies with legends, phrases, or names (e.g., Customer Copy, For Accounting Purposes Only, etc.); address each report copy to speed distribution; spot carbon or field blackout functions; identification and deletion program controlled. Provides customized forms with the identification, deletion and formatting functions.

- Forms Overlay (both modes)

Optical image system; prints high quality document and report formats, designs or other constant data; merge format and data; program controlled.

- Single Part Continuous Form Output

Including custom printed forms; no delevaing; no carbon disposal; faster job separation making use of the Mark Form function.

Printing is on single part continuous forms Common Use sizes or ISO sizes. Printing is repeated for multiple copies. Every copy is original quality.

- Optional Burster-Trimmed-Stacker Output

Eliminates bursting and delevaing bottlenecks; offset separation between data set copies; remove output while printing; first-in, first-out job sequence; trimmed edges.

- Optional Channel Switching

Manual switches provide system configuration flexibility through the use of the 3814 Switching Management System, or the 2914 Manual Switch model 1 (RPQ 880882), or the Two-Channel Switch (#8180); automatic switching is provided by the Dynamic Two-Channel Switch (#8181) for two processors in a tightly coupled multiprocessing configuration, and two channels on a single CPU providing alternate path capability.

- Laser Safety

The 3800 contains a laser assembly. A number of countries presently have, and others are considering, the adoption of regulations governing the use of laser products. The customer is responsible for determining the extent of regulations governing the use of laser products at their location.

- Forms

Prints on discrete form sizes. Common Use Paper Sizes:

Utilizes five form depths -- 3-1/2 in., 5-1/2 in., 7 in., 8-1/2 in., 11 in. and ten form widths (measured edge to edge) -- 6-1/2 in., 8-1/2 in., 9-1/2 in., 10-5/8 in., 11 in., 12 in., 12-5/8 in., 14.3 in., 14-7/8 in. which permutes to 50 discrete sizes. Forms

are refolded in 7 in. (2 x 3-1/2), 8-1/2 in. and 11 in. (2 x 5-1/2) in lengths.

- ISO Paper Sizes

Six form depths of 3 in., 4 in., 6 in., 8 in., 10 in., 12 in. and thirteen form widths (measured edge to edge) of 165, 180, 215, 235, 250, 270, 280, 305, 322, 340, 363, 375, 378mm. Forms are refolded into 6-, 8-, 10-, and 12-inch lengths.

Character and forms overlay printing restricted from first and last 0.5 inch of forms length. A printed line can begin a minimum of 0.5 inch from the left paper edge and cannot exceed a length to position a character nearer than 0.5 in. from the right paper edge for all widths except 14-7/8 in. in compatibility mode where the stated dimension is 0.775 inch from the right.

Paper weight must be from 56 to 90 grams per square meter. See the "Forms Design Reference Guide for the IBM 3800 Printing Subsystem", GA26-1633, for details of weight and other forms considerations. Left-hand side of form is a fixed location in the machine, print line adjustment is by electronically moving the line. First print position can move to the right 5.7 inches (compatibility mode only), but will cause an equivalent number of positions at the right end to be moved beyond the above defined print line boundaries.

It is recommended that printing not occur within 0.100 inch of any binder holes or corner cuts within the form.

**Publications:** The following publications are for the model 8 and are in addition to those available for the model 3: GA32-0065, GA32-0055, GA26-1633.

## SPECIFY

- Power (AC, 3-phase):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
230V #2827	220V #2800
235V or	230V #9905
240V #2818	240V #9915
380V #2816	
400V #2825	
408V #2819	
415V #2826	

- Color (for end cover only, machine color is cloud white): #9041 for red, #9042 for yellow, #9043 for blue, or #9045 for gray.

- Machine Nomenclature:

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931

- Paper Sizes: #2741 - Common Use; #2742 - ISO

Common Use Paper Sizes (#2741); enables the 3800 to process the following forms depths and widths:

Five Forms Depths (in inches): 3-1/2, 5-1/2, 7, 8-1/2, 11  
Ten Forms Widths (in inches, edge to edge): 6-1/2, 8-1/2, 9-1/2, 9-7/8, 10-5/8, 11, 12, 13-5/8, 14.3 14-7/8

Limitations: Cannot be installed with ISO Paper Sizes (#2742) Maximum: One. Field Installation: RPQ only.

ISO Paper Sizes (#2742): Enables the 3800 to process the following forms depths and widths:

Six Forms Depths (in inches): 3, 4, 6, 8, 10, 12 (in mm): 76.2, 101.6, 152.4, 203.2, 254.0, 304.8  
Thirteen Forms Widths (in mm, edge to edge): 165, 180, 215, 235, 250, 270, 280, 305, 322, 340, 363, 375, 378

## MACHINES

Limitations: Cannot be installed with Common Use Paper Sizes (#2741). Maximum: One. Field Installation: RPQ only.

### ● Tool Kit for model 8:

For rental or Term Lease (ICC) customer, select one:

1. First 3800 (model 1, 2 or 8) ordered, specify #9330 when ordering a model 8.
2. If unit ordered is second or higher 3800 model 8 to be installed, no additional tool kit is required.
3. If a 3800 model 1 or 2 is installed and a model 8 is ordered to supplement or replace the model 1 or 2, specify #9331 (Special Tool Group) which will bring the existing tool kit up to the level required for the model 8.
4. If 3800 model 1 or 2 is being field converted to a model 8, specify #9331 (Special Tool Group) which will bring the existing tool kit up to the level required for the model 8.
5. If required for a multiple machine installation, because of physical machine locations, an additional tool kit(s) is available on a no-charge MES.

For purchase customer, select one:

1. For each new purchase 3800 model 8, specify #9330.
2. When Rental 3800 model 8's are purchased, a tool kit (#9330) is to be ordered on a no-charge MES for each machine.
3. When a purchased model 1 or 2 is being field converted to a model 8, specify #9331 (Special Tool Group) which will bring the existing tool kit up to the level required for the model 8.

**Note:** A Tool Kit (#9220) is required with Burster-Trimmed-Stacker (#1490); see #1490 below.

## SPECIAL FEATURES

**Accumulator (#1010):** The accumulator is used to generate complex pages that require more characters than can be held in raster pattern storage. The page can be viewed as having been created in layers (each layer associated with a group of character sets or images). The layers are "accumulated" until the complex page is complete. Images which are too large for raster pattern storage are placed in the accumulator for printing. This feature provides 768K bytes of storage which will hold data for up to 106 square inches of image. Maximum: One. Field Installation: Yes.

**Accumulator Expansion (#1021):** This feature adds 256K bytes of storage to the Accumulator (#1010) for a total of 1024K bytes which will hold data for up to 142 square inches of image. For use with Common Use Paper Sizes (#2741). Maximum: One. Field Installation: Yes. Prerequisites: #1010 and #2741.

**Accumulator Expansion, ISO (#1022):** This feature adds 512K bytes of storage to the Accumulator (#1010) for a total of 1280K bytes which will hold data for up to 178 square inches of image. This is

only for machines that have ISO Paper Sizes (#2742) and allows printing of the largest image possible on the maximum ISO paper size. Maximum: One. Field Installation: Yes. Prerequisites: #1010 and #2742.

**Burster-Trimmed-Stacker (#1490):** Provides an additional output stacking method. Bursts the five Common Use forms lengths or the six ISO lengths to individual sheets and stacks sheets sequentially. Also trims left and right 0.5 inch carrier strip from output sheet. Maximum: One. Field Installation: Yes. Prerequisites: #9220. For rental customer specify #9220 for first Burster-Trimmed-Stacker feature ordered for a customer. If required for a multiple machine installation because of physical machine locations, an additional tool kit(s) is available on a no-charge MES. For purchase customer specify #9220 on each Burster-Trimmed-Stacker feature order. When installed Burster-Trimmed-Stackers are purchased, a tool kit is to be ordered on a no-charge MES for each feature.

**Raster Pattern Storage, Add'l (#5410):** Base machine comes with 256K bytes, storage maximum is 512K bytes in one additional storage increment of 256K bytes. Provides storage for multiple character sets and can be used to hold small images. Maximum: One. Field Installation: Yes.

**Remote Switch Attachment (#6158):** To attach the Two-Channel Switch (#8180) to a configuration control panel. Maximum: One. Field Installation: Yes. Prerequisites: #8180.

**Two-Channel Switch (#8180):** To attach the 3800 to two S/370, 30XX, or 4300 Processor channels which may be on the same CPU or on two different CPUs. On the model 1 both interfaces must have the same device address. The model 8 can have different addresses. The two-channel switch will allow operation on only one channel at a time. Selection of the channel which is to be operable is by means of manual switches on the control panel. Maximum: One. Field Installation: Yes.

**Dynamic Two-Channel Switch (#8181):** Provides the additional capability of an automatic two channel switch. The switch is designed to furnish symmetric two processor support for tightly coupled multiprocessor systems and to attach to two channels from a single CPU to provide alternate path capability. For either tightly coupled multiprocessors or single CPU attachments, data transfer occurs only one channel path at a time. Maximum: One. Field Installation: Yes. Prerequisites: #8180.

## MODEL CONVERSION

3800 model 1s or 2s which are purchased or under an ICC Term Lease can be converted to a model 8 by MES. Conversion from a 3800 model 8 to a 3800 model 1 or 2 is not available.

## ACCESSORIES (NONE)

## SUPPLIES

Contact your country DP Supplies Coordinator.

## 3803 TAPE CONTROL MODEL 1

**THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT**

### PURPOSE

Control unit for 3420 Magnetic Tape Units models 3, 5, 7 for S/370 (except models 115 and 125) 1, 30XX, and 4300 processors.

### MODEL 1

Model 1 001

**Limitations:** Attachable to all S/370 1, 30XX, 4300, and 9375, 9377 processors except S/370 mdl 115 and 125. S/370 mdl 135, 135-3 and 138 are not supported on byte multiplexer channel for concurrent operation with Integrated File Adapter, Integrated Communications Adapter, Selector Channel on 3135-3, 3138.

When attached to a S/360 mdl 30, operating in compatibility mode:

- Two-channel Switch (#8100) is not supported.
- 3420/1400 compatibility #9750 must be specified for the S/360 mdl 30.

These limitations do not apply when the S/360 mdl 30 is operating in native mode for I/O operations; for example, under CS/30.

Attachable to 4300 processors. For considerations, see "4331 Channel Characteristics, GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2), GA33-1550 (Mdl Group 11) or GA33-1567 (4361). Note: 3803 cannot be attached to a byte multiplexer channel on the 4341 Processor.

3420 mdls 4, 6 or 8 cannot be addressed through a 3803 mdl 1.

**Prerequisites:** A control unit position on a S/370 1, 30XX, 4300, or 9375, 9377 processor channel or Tape-to-printing Subsystem feature (#7810) on a 3800 Printing Subsystem. When used with a 3800 with feature #7810, at least one path, which may be switchable, must be provided to a S/370 or 4300 processor. When multiple control units (up to eight are allowable) are connected to a 3800, all other than one must have power sequencing and control connection provided by a system.

For S/360 mdl 30: If the 3803 Tape Control is attached to the 2030 Selector Channel via the 1400 Magnetic Tape Compatibility feature (#4468), the 3420/1400 Compatibility (#9750) is required on the 2030.

### HIGHLIGHTS

- Single channel control for up to eight 3420 tape units
- Through special switching features, up to 16 tape drives can be addressed through any of four 3803 control units.
- Features are offered to provide performance at 556 and 800 bpi in the 7-track NRZI format or at 800 bpi in the 9-track NRZI format or at 1600 bpi phase encoded.

The following table indicates feature numbers for corresponding functions:

Subsystem Function	Feature Name	3420 Tape Unit	3803 Control Unit
1600 bpi PE 9-track only	Single Density	#6631	#9570
1600			

bpi PE/800 track	Dual Density	#3550	#3551
1600 bpi PE/800 NRZI 7-track	Seven-track	#6407*	#6408

\* Tape unit will only read or write 7-track tape.

**Publications:** S/370 -- GC20-0001

### SPECIFY

- Power (AC, 3-phase):**

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	
- Color:** #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Machine Nomenclature:** #2927 for English, #2928 for French, #2929 for German.
- Tape Type:** Either Dual Density (#3551) or Seven-track (#6408) must be ordered unless Single Density (#9570) is specified. Only one of the three features may be installed.
- Tape Switching:** If a tape switching configuration is being ordered, the 3803 must be equipped with a Communicator 1-2, #9071, for a control unit with the 2-control Switch (#1792), 3-control Switch (#1793), or 4-control Switch (#1794). Communicator 3-4 (#9073) for a control unit included in a 3x16 or 4x16 switching configuration which does not have features #1792, #1793 or #1794. If a Communicator feature is ordered for a 3803 without a switching feature, no tape units can be attached to that control unit. See "Tape Switching".

### SPECIAL FEATURES

**Dual Density (#3551):** Provides for attachment of tape units equipped with Dual Density (#3550) to read and write tapes at either 1600 bpi PE or 800 bpi NRZI 9-track. Tape units equipped with Single Density (#6631) can also be attached. Limitations: Cannot be installed in the same control unit with either Single Density (#9570) or Seven-track (#6408). Field Installation: Yes.

**Remote Switch Attachment (#6148):** Provides for remote operation of the Two-channel Switch (#8100) on the 3803 mdl 1 from a remote console such as the configuration control panel (3058 or 3068) for a S/370 mdl 158MP or 168MP. Operation of the switch on the remote console will result in the same function as operation of the 3803 switch. The 3803 switches will be functionally inoperative when this feature is installed. The cable to the remote console is not provided by this feature. The cable used must contain three wires for each Enable/Disable switch to be installed. Each line must have a total loop resistance of less than 75 ohms when the remote switch completes the path. For operation with the 3058 or 3068, cable P/N 5351178 is required and should be ordered on a separate MES. Field Installation: Yes.

**Seven-track (#6408):** Provides for attachment of tape units equipped with Seven-track (#6407) to read and write tapes at either 556 or 800 bpi in the 7-track format compatible with tapes written by 729, 7330,

7335, and 2400 series tape units equipped with 7-track read/write heads. Includes the translator function which, when used, causes 8-bit bytes from the I/O interface to be written on tape as 6-bit BCD characters and 6-bit BCD characters read from tape to be translated into their EBCDIC equivalents. The Data Conversion function, also included, allows reading and writing of 8-bit bytes on 7-track tape by converting four tape characters into three storage bytes and vice versa. Tape units equipped with Single Density (#6631) can also be attached. Limitations: Cannot be installed in the same control unit with either Single Density (#9570) or Dual Density (#3551). Tape units operating in 1600 bpi PE mode can also be attached. Field installation: Yes.

**Two-channel Switch (#8100):** Permits connection of the 3803 Tape Control to a second channel. Alternate path switching between two channels on the same system is under program control. Partitioning of attached tape units between channels on two different systems can be done using current procedures for logical device partitioning. These procedures involve the proper use of the operator commands, VARY ON/VARY OFF (OS) or DVCDN/DVCUP (DOS). Further information concerning this type of operation is contained in the 3803/3420 Sales and Systems Guide, ZZ20-2254. Field installation: Yes.

**Tape Switching:** Switching configurations, via two, three or four control units, are available to provide access to:

- Up to eight tape units attached to a single control unit;
- Up to 16 tape units, with eight attached to each of two control units.

All switchable tape units must be attached to the control units equipped with the switching features (2-control Switch, 3-control Switch or 4-control Switch). Each control unit must be equipped with the appropriate Single Density, Dual Density, or Seven-track feature for any any drive in the pool to which it has access.

The table below indicates features required for the available switching options.

Switching Options	Features Required	Feature Numbers	
		On 1st 3803	On 2nd 3803
2 x 8	Communicator 1-2	#9071	#9071
	2-Control Switch	#1792	----
3 x 8	Communicator 1-2	#9071	#9071
	3-Control Switch	#1793	----
4 x 8	Communicator 1-2	#9071	#9071
	4-Control Switch	#1794	----
2 x 16	Communicator 1-2	#9071	#9071
	2-Control Switch	#1792	#1792
3 x 16	Communicator 1-2	#9071	#9071
	Communicator 3-4	----	----
	3-Control Switch	#1793	#1793
4 x 16	Communicator 1-2	#9071	#9071
	Communicator 3-4	----	----
	4-Control Switch	#1794	#1794

Switching Options	Features Required	Feature Numbers	
		On 3rd 3803	On 4th 3803
2 x 8	Communicator 1-2	----	----
	2-Control Switch	----	----
3 x 8	Communicator 1-2	#9071	----
	3-Control Switch	----	----
4 x 8	Communicator 1-2	#9071	#9071
	4-Control Switch	----	----
2 x 16	Communicator 1-2	----	----
	2-Control Switch	----	----
3 x 16	Communicator 1-2	----	----

4 x 16	Communicator 3-4	#9073	----
	3-Control Switch	----	----
	Communicator 1-2	----	----
	Communicator 3-4	#9073	#9073
	4-Control Switch	----	----

**Note:** For assistance in ordering, refer to "Subsystem Description Manual", GA32-0020 or GA32-0021, for graphic presentation of switching configurations.

### 3420/3803 Attachment Possibilities

#### Notes:

- All 3803s, irrespective of feature mix, can control tape drives operating in 1600 bpi PE mode.
- No 3803 can have the capability to control tape drives with nine-track NRZI features and tape drives with seven-track NRZI features.
- It is not possible to have more than one of the feature numbers listed in the following table in any one unit (3803 or 3420).

3420 mdl 3, 5 & 7	3803 w/ Single Density	3803 w/Dual Density	3803 w/ Seven- Track
Features	(#9570)	(#3551)	(#6408)
#6631 Single Density 1600 bpi PE	Yes	Yes	Yes
#3550 Double Density operating in 1600 bpi PE mode	Yes	Yes	Yes
#3550 Double Density operating in 800 bpi NRZI mode	No	Yes	No
#6407 7-Track 556 or 800 bpi NRZI	No	No	Yes

### MODEL CONVERSIONS

A 3803 model 1 may be converted to a 3803 model 2 in the field. If the 9-track NRZI feature is installed, it will be removed when the 3803 model 1 is converted to a model 2.

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3803 TAPE CONTROL MODEL 2

### PURPOSE

Control unit for 3420 Magnetic Tape Units models 3 through 8 for S/370 (except models 115 and 125), 30XX, and 4300 processors.

### MODEL 2

#### Model 2 002

- Prerequisites:** Control unit position on S/370, 30XX, 4300, or 9375, 9377 processor channel or Tape-To-Printing Subsystem feature (#7810) on a 3800 Printing Subsystem. When used with a 3800 with feature #7810, at least one path, which may be switchable, must be provided to a S/360, S/370 or 4300 processor. When multiple control units (up to 8 are allowable) are connected to a 3800, all other than one must have power sequencing and control connection provided by a system. If attached to a 2860, a 3803 Mdl 2 Attachment (#7850) is required on each channel to which 3803 mdl 2s are attached. For #7850, specify #9181 for the first channel of a 2860, #9182 for the second channel, #9183 for the third channel. See M2860 pages.

### HIGHLIGHTS

- Standard control unit provides 6250 and 1600 bpi densities.
- 6250 Encoding/Checking Logic allows error correction without stopping or interrupting the read/write operation for any single track or combinations of two tracks simultaneously. Errors may be corrected in all nine tracks of a single data block providing they occur in combinations of no more than two tracks at a time. Long tape blocks are subdivided by resync bursts which are inserted within the block to allow error tracks to return to full operation when reading forward, thereby restoring maximum error correction capability.
- Optional features provide 9-track (800 bpi) NRZI, or 9-track (800 bpi) NRZI with 7-track (800, 556, 200 bpi) NRZI formats.
- Nine-track NRZI with Seven-Track NRZI features permit mixing 9- and 7-track tape units on the same 3803 mdl 2.

The following table indicates features for corresponding functions:

*-----*				
Subsystem	Control Unit 3803 mdl 2		Tape Unit 3420-	Unit 3420-
Density	Feat. Name	Feat. No.	3,5,7 Feat No.	4,6,8 Feat No.
9T-6250	---	Std.	N/A	#6420
9T-6250+1600	---	Std.	N/A	#6425
9T-6250+1600 +800	9-Trck NRZI	#5310	#3550	N/A
9T-6250+1600 +800 with 7T -800-556-200	7-Trck NRZI	#6320	#6407	N/A
*-----*				

\* Requires #5310.

- A pool of up to 16 tape units may be switched between 2, 3 or 4 control units.
- A 3803, via a two-channel switch, connects to two channels of the same system or two channels of different systems.

- In 50 Hz, a 3803 mdl 2 provides signal and power attachment for up to eight 3420 mdls 3, 4, 5, 6, 7 and 8.
- In 60 Hz, 3420s may be attached as described under "Limitations".

**System Attachment:** The 3803 mdl 2 attaches to S/370, 30XX, or 4300 processor via the indicated channels:

System	3420 mdl 4	3420 mdl 6
135	Selector*	Selector*
135-3,138	Blk Mltplxr	Blk Mltplxr
145	Selector*	Selector*
145-3,148	Blk Mltplxr	Blk Mltplxr
155,158	Blk Mltplxr	Blk Mltplxr
165,168,195	2860/2880	2860/2880
3031,3032, 3033	Blk Mltplxr	Blk Mltplxr
3081,3083, 3084	Blk Mltplxr	Blk Mltplxr
3090	Blk Mltplxr	Blk Mltplxr
4331	Blk Mltplxr	Note 1
4341,4361, 4381	Blk Mltplxr	Blk Mltplxr
9375	Blk Mltplxr	Blk Mltplxr
9377	Blk Mltplxr	Blk Mltplxr

System	3420 mdl 8
135	Selector*
135-3,138	Blk Mltplxr
145	Selector*
145-3,148	Blk Mltplxr
155,158	Blk Mltplxr
165,168,195	2860/2880
3031,3032, 3033	Blk Mltplxr
3081,3083, 3084	Blk Mltplxr
3090	Blk Mltplxr
4331	Note 1
4341,4361, 4381	Blk Mltplxr
9375	Blk Mltplxr
9377	Blk Mltplxr

\* With or without Block Multiplexer Channel (#1421).  
Note 1: Not attachable to Mdl Group 1

**Limitations:** (1) 3803 mdl 2 attachment to S/370 mdls 135, 135-3, 138, 145, 145-3 and 148 is configuration-sensitive because of potential system overrun. Consult System/370 Model 135 Channel Characteristics (GA33-3010) or System/370 Model 145 Channel Characteristics (GA24-3573). (2) The 3803 mdl 2 is not supported for attachment to byte multiplexer, multiplexer, or 2870 selector sub-channels. (3) The 3803 mdl 2 operating with 3420 mdl 8s is limited to a maximum channel-to-control unit (total x dimension) cable length of 119 feet to the 2880 or selector channel of a S/370 mdl 145, 119 feet to the block multiplexer channel of a S/370 mdl 145-3 or 148, 103 feet to the block multiplexer channel of a S/370 mdl 155, 3032 or 3033, and 72 feet to a 2860 or 3092. (4) The 3803 mdl 2 provides power and signal connections for 3420 tape drives. Up to eight drives of any mdl can be signal-connected to a 3803 mdl 2. Note that 3420 mdls 4, 6 and 8 must signal-connect to a 3803 mdl 2. In 50 Hz, one 3803 (either mdl 1 or mdl 2) provides power for up to eight 3420 mdls 3, 4, 5, 6, 7 and 8. In 60 Hz, when the tape subsystem includes 3420 mdl 8s, one 3803 (mdl 1 or mdl 2) may power a maximum of six 3420 mdl 8s or combinations of drives as listed in the table below. (5) For 4331 considerations see the "4331 Channel Characteristics".

GA33-1527 (Mdl Group 1), GA33-1535 (Mdl Group 2) or GA33-1550 (Mdl Group 11).

The maximum number of drives which may be powered from one 3803 without #9001 (Auxiliary AC Power Supply) are listed below.

Number of 3420 Mdl 8s	and	Number of 3420 Mdl 7s	and	Number of 3420 Mdls 3-6
6		0		0
5		1		0
5		0		2
4		2		1
4		1		2
4		0		3
3		4		0
3		3		1
3		2		2
3		1		4
3		0		5
2		5		0
2		4		2
2		3		3
2		2		4
2		1		5
2		0		6
1		*		*

\* If only one 3420 mdl 8, then any combination of seven additional tape units is permissible.

When the subsystem includes more than one 60 Hz 3803 mdl 2 and the number of tape drives which must be signal-connected to a control unit exceeds the maximum number of drives which may be powered from one 3803 (see table above), obtain power from another control unit using a separate power cable (Group 145). Separate signal cable (Group 144) is also available. In 60 Hz, a power supply feature (#9001) is available(not required for 50 Hz units), which allows eight 3420s of any mdl to be powered from one 60 Hz 3803 mdl 2. See "Specify". This feature is necessary only if: (1) The subsystem includes only one 60 Hz 3803 mdl 2 and the drives to be powered from it exceed the maximum specified in the table above, or (2) The power load still exceeds the table limitations for a 60 Hz 3803 when distribution by re-cabling with separate power and signal cables has been considered.

**Bibliography:** GC20-0001

## SPECIFY

- Power (AC, 3-phase): Must be consistent with system voltage.

50 Hz	60 Hz (4-wire)
200V #2807	208V #9903
220V #2815	230V #9905
235V #2818	
380V #2816	
408V #2819	

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.

- Machine Nomenclature:

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931

- Density: 6250 and 1600 bpi are standard and do not need to be specified. In addition, order Nine-Track NRZI (#5310) or Seven-Track NRZI (#6320) if required. See "Special Features".

- Tape Switching: If a tape-switching configuration is being ordered, the 3803 must be equipped with a Communicator (#9071 or #9073). See table under "Tape Switching" below. If

a Communicator feature is ordered for a 3803 without a switching feature, no tape units can be signal-attached to that control unit.

- On 60 Hz units only:
- Auxiliary AC Power Supply: #9001. Required to power more than six 3420 mdl 8s from one 3803 mdl 2. #9001 is neither required nor available on 50 Hz units. Also may be required to power 3420 mdl 8s in combination with other drives. See "Limitations" above. Requires 100 ampere power source.

## SPECIAL FEATURES

**Nine-Track NRZI (#5310):** Required for the attachment of 3420 mdls 3, 5 or 7 equipped with Dual Density (#3550). Allows attached tape drives to read and write data in a 9-track 800 bpi format as well as 1600 bpi (Phase Encoded) format. Field Installation: Yes.

**Remote Switch Attachment (#6148):** Provides for remote operation of the Two-Channel Switch (#8100) on the 3803 mdl 2 from a remote console such as the configuration control panel (3058 or 3068) for a S/370 mdl 158MP or 168MP. Operation of the switch on the remote console will result in the same function as operation of the 3803 switch. The 3803 switches will be functionally inoperative when this feature is installed. The cable to the remote console is not provided by this feature. The cable used must contain three wires for each Enable/Disable switch to be installed. Each line must have a total loop resistance of less than 75 ohms when the remote switch completes the path. For operation with the 3058 or 3068, cable P/N 5351178 is required and should be ordered on a separate MES. Field Installation: Yes.

**Seven-Track NRZI (#6320):** Required for the attachment of 3420 mdls 3, 5 or 7 equipped with Seven-Track (#6407). Allows attached tape drives to read and write data in 7-track/200, 556 or 800 bpi format. Prerequisites: #5310. Field Installation: Yes.

**Two-Channel Switch (#8100):** Permits connection of the 3803 to a second channel. Alternate path switching between two channels on the same system is under program control. Partitioning of attached tape units between channels on two different systems can be done using current procedures for logical device partitioning. The procedures involve the proper use of the operator commands, VARY ONLINE/VARY OFFLINE (OS) or DVCDN/DVCUP (DOS). Field Installation: Yes.

**Tape Switching (#1792-#1794):** Switching configurations, via two, three or four control units are available to provide access to:

- Up to eight tape units attached to a single control unit.
- Up to 16 tape units, with eight attached to each of two control units.

All switchable tape units must be signal-attached to the control units equipped with the switching features (2-Control Switch, 3-Control Switch or 4-Control Switch). Each control unit must be equipped with the appropriate density feature for any drive in the pool to which it has access. Field Installation: Yes.

The following table indicates features required for the available switching options.

Switching Features		Feature Numbers	
Options	Required	On 1st 3803	On 2nd 3803
2 x 8	Communicator 1-2	#9071	#9071
	2-Control Switch	#1792	----
3 x 8	Communicator 1-2	#9071	#9071
	3-Control Switch	#1793	----
4 x 8	Communicator 1-2	#9071	#9071
	4-Control Switch	#1794	----
2 x 16	Communicator 1-2	#9071	#9071

**MACHINES**

	2-Control Switch	#1792	#1792
3 x 16	Communicator 1-2	#9071	#9071
	Communicator 3-4	----	----
	3-Control Switch	#1793	#1793
4 x 16	Communicator 1-2	#9071	#9071
	Communicator 3-4	----	----
	4-Control Switch	#1794	#1794

	2-Control Switch	----	----
3 x 16	Communicator 1-2	----	----
	Communicator 3-4	#9073	----
	3-Control Switch	----	----
4 x 16	Communicator 1-2	----	----
	Communicator 3-4	#9073	#9073
	4-Control Switch	----	----

**Note:** For assistance in ordering, refer to Subsystem Description Manual, GA32-0020 or GA32-0021, for graphic presentation of switching configurations.

Switching Options	Features Required	Feature Numbers	
		On 3rd 3803	On 4th 3803
2 x 8	Communicator 1-2	----	----
	2-Control Switch	----	----
3 x 8	Communicator 1-2	#9071	----
	3-Control Switch	----	----
4 x 8	Communicator 1-2	#9071	#9071
	4-Control Switch	----	----
2 x 16	Communicator 1-2	----	----

**MODEL CONVERSIONS**

A 3803 model 1 may be converted to a 3803 model 2 in the field.

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 3812 PAGEPRINTER

### PURPOSE

The Pageprinter (3812) is a low-priced, multifunction, non-impact page printer of table-top design. It provides letter-quality text and all points addressable graphics prints at a maximum speed of 12 pages/minute and is designed to produce up to 18,000 pages per month.

### MODELS

#### Model 1 001

#### Model 2 002

**Customer Setup (CSU):** The 3812 is designated as a customer setup machine thereby offering the customer early availability and relocation flexibility. Setup procedures for the customer will be shipped with each machine. The Marketing Representative must advise the customer of his responsibilities before receipt of the machine. For additional information on CSU, refer to GI section.

### HIGHLIGHTS

- The 3812 uses a light emitting diode (LED) printhead and produces single-sided printed output at up to 12-pages per minute for letter size and up to 9.6-pages per minute for legal size, face down in sequential order in the output tray which can hold up to 550 sheets of 20-pound paper. The jobs in the output tray may be offset under program control.
- The 3812 can attach to PCs, S/36-S/38 or VM, but not concurrently. Cables, cards and diskettes will have to be changed to support the desired environment. This change can be made after installation on the customer's existing 3812 by the customer. The customer will need to order from IBM (at an additional cost) the appropriate feature to adapt the 3812 to the new environment (i.e., feature #3015-S/36 Attachment). See "Special Features" for appropriate feature and part number.
- An RS-422 attachment is also included.
- The 3812 is directly attached to the IBM PC, PC/XT, PC/AT, 3270-PC (Native DOS mode only), 3270 Personal Computer AT, IBM Personal System/2, RT PC, and PC Portable via the RS-232-C asynchronous port. Modem attachment of the 3812 to these PCs and the RT PC is not supported.
- The 3812 can be attached to 1 IBM Personal Computer on a stand-alone basis or to up to 8 IBM Personal Computers via an optional Sharing Card, or to multiple IBM Personal Computers via the IBM PC Network or the IBM Token-Ring Network. The Sharing Card does not support 3270 Control Program, 3270 Emulation Program/RT PC.
- VM attachment is provided via an IBM 3705/3725 control unit or 4331 and 4361 ICA, or 9370 Telecommunications Subsystem using an RS-232-C BSC line, the 3812 Bisync Communications feature (#3060) and the required Pageprinter (3812) VM Support Program Offering (5798-DTE). This attachment does not support vector graphics capability.
- Direct attachment (5219 emulation) to the System/36, System/36 PC, System/38 and to the 5294 communicating to System/36 or System/38, is provided via the System/36 and System/38 Attachment Feature. 5219 emulation does not support image, vector graphics, or Enhanced Support capabilities of the Pageprinter.
- Provides letter-quality printing at up to 12 pages per minute (maximum). (This will vary depending on the application.)
- Will print combined text and graphics.
- Print resolution of 240 x 240 dots per inch.
- All points addressable graphics.
- Supports Vector Graphics.
- LED (Light Emitting Diode) printhead technology (no moving parts).
- Basic paper handling includes two input cassettes (550 pages and 250 pages of 20-lb. paper); A4, B5, executive, legal and letter cut-sheet paper, letterhead. Gummed labels are also supported via the secondary cassette only.
- Direct attachment to the IBM PC, PC/XT, PC/AT, RT PC with software and hardware consideration, 3270 Personal Computer AT, 3270-PC and PC Portable via the RS-232-C port.
- Multiple PCs may be attached via the PC network and the IBM Token-Ring Network.
- Attachment to the System/36, System/38 or the 5294 communicating to a System/36 and System/38 (5219 emulation). Attachment to the System/36-PC is supported under Release 5 of S/36 SSP.
- Zero, 90, 180, and 270 degree print orientations standard.
- Audible alarm when operator intervention required.
- UP to 62 fonts shipped standard with printer, including up to 8 typographic fonts.
- Operator-replaceable supplies (toner, photoconductor, developer, fuser).
- Sequential, face-down, program-controlled offset output (up to 550 pages).
- Quiet operation; up to 48 dBA (standby), up to 56 dBA (operational).
- No usage charge.
- Self diagnostics.
- Oversize and special characters, logos, and business graphics.
- 1.2M byte removable diskette containing microcode, diagnostics, and fonts in the PC environment with the exception of the RT PC.
- Enhanced Support (included in the Model 2 and not applicable to the the System36/System38 Attachment (#3015) unless the IPDS feature (#3192) is installed.)

### HIGHLIGHTS OF ENHANCED SUPPORT

Characters that are only partially on the page will print partially on the page.

For printing long jobs, a new PMP command allows the IBM Pageprinter 3812 to select paper from the cassette with paper. Known as the "Set Device Mode". Each time a Print Page command is executed, the paper drawer selected by the Print Page command is examined. If the drawer is empty, paper is fed from the other drawer instead. An out-of-paper occurs if both drawers are empty. The exit tray of the printer holds approximately 550 sheets, which is also the number of sheets in the primary drawer. Therefore, using this function may result in a "remove prints" indication before both the primary and alternate cassettes are empty.

If unprinted data remains in the 3812 printer memory for more than three seconds, the Job In Process (JIP) light on the printer operator panel will begin flashing. If the 3812 Start key is pressed while the JIP light is flashing, the page-in-printer memory will be printed and the memory erased. This new feature is useful when an application program fails to provide a form feed command at the end of a print job.

A dynamic in-printer-memory font index is created each time the 3812 is powered on, or whenever the 3812 operational diskette is changed. This may improve printer performance by reducing the time required to locate a font on the operational diskette. Enhanced 3812 Support for 3812s attached to PC, PC/XT, PC/AT, and RT PC provides image decompression. MMR compression is the name given to the compression algorithm specified by the 2-dimensional CCITT draft recommendation T.4, where the number of two-dimensionally encoded rows between each 1-dimensionally encoded row is infinite.

### Physical Specifications:

#### • Size Dimensions:

Length: 68cm (27 in.)  
Depth: 48cm (19 in.)  
Height: 38cm (15 in.)

- Dimensions with Cassettes:
  - Length: 122cm (48 in.)
  - Weight:
    - 61.9kg (134 lbs.) without cassettes
    - 66kg (145 lbs.) with cassettes
- Throughput:
  - Up to 12 pages/minute for letter size
  - Up to 9.6 pages/minute for legal size
- Usage: Up to 18,000 pages/month
- Paper weights: 60 - 90gm/sq.m cut-sheet (16 - 24 pound)
- Cut-sheet sizes (inches):
  - JIS B5 - 182 x 257mm (7.2 x 10.1 in.)
  - Executive:
    - 178 x 267mm (7.0 x 10.5 in.)
    - 184 x 267mm (7.25 x 10.5 in.)
    - 190 x 268mm (7.5 x 10.5 in.)
  - Letter - 216 x 279mm (8.5 x 11.0 in.)
  - ISO/JIS A4 - 210 x 297mm (8.3 x 11.7 in.)
  - Legal - 216 x 356mm (8.5 x 14.0 in.)
- Input capacities: (75gm/sq.m, 20 lb.)
  - Primary 550-page cassette
  - Secondary 250-page cassette
- Special input types: Gummed labels, letterhead.
- Output capacity: 550 pages, sequenced, offset (20 lb.)(75gm/sq.m).
- Print quality: Letter quality.
- Graphics resolution: 240 x 240 dots per inch.
- Imaging tolerances: 1.5mm registration.
- Acoustics: up to 56 dBa (operation); up to 48 dBa (standby)

### Operating Environment: IBM Class B, defined as:

Temperature: 15.6 - 32.2C (60 - 90F)  
 Relative Humidity: 8 - 80 percent  
 Wet Bulb Temperature: 0.6 - 29.4C (33 - 85F)  
 Altitude: 0 - 2,135m (0 - 7,000 ft)

### Certification:

IEC 435 - Certified Canadian CSA  
 IEC 380 - Certified Canadian CSA  
 VDE 871 - Certified by VDE

### AAS Ordering Instructions: The 3812 is a system component.

**Ordering Information:** The country requirement is determined by the 3-digit country code. The following standard items are shipped with the printer and need no specification:

- Ship group publications.
- Power cords.
- Two paper cassettes (one primary, one secondary).
- One toner cartridge.
- One photoconductor unit.
- One developer unit.
- One fuser unit.
- One exit tray.
- One diskette (containing the Pageprinter microcode and the Pageprinter fonts).
- One diskette (containing PC Aid Program).
- Operator information labels.
- Any optional features ordered will be included with the printer in separate overpacks.

### Customer Responsibilities: The customer is responsible for:

1. Ordering appropriate cables and attachment features.

2. Adequate site, system and other preparation as described in "Installation and Planning Guide", G544-3265.
3. Physical setup, connection of cables and checkout.
4. Following the documented cleaning procedures; using and following the problem-determination procedures prior to calling "Service".

**Note:** Phone assistance is available to assist customers with fulfilling customers' responsibilities.

(Canada only > For 3812s purchased from IBM, call 1-800-IBM-7378. <)

For 3812s purchased from Authorized IBM Dealers, contact your point of sale.

5. Ordering and replacing those items specified as "supplies," namely toner, photoconductor unit, developer unit, and fuser unit.
6. Contacting National Service Division to make cable connection of IBM CSU units to IBM non-CSU units where customer-access areas are not provided.

Customer should normally stock at least one extra unit of each supply at all times for problem determination procedure exchanges, unless they decide that one set can be used for determination procedures on multiple 3812 installations.

**Note:** CSU assistance is available from National Service Division at the current hourly service rates and terms. CSU assistance does not include the installations of supplies, which is a customer responsibility.

**Publications:** Publications language "Bill of Materials" provide with one part number, one of each manual for that language plus a binder and binder sleeve for the Guide To Operations.

Language	Bill of Material
Canadian French	1686381
US English	1686372
Japanese	1686375
Spanish	1686384

**Canadian French B/M Ship Group (P/N 1686381):** This bill of materials will contain the following items.

Setup Instructions - P/N 1686321  
 Guide To Operations - P/N 1686349  
 Binder-Guide To Operations - P/N 4588040  
 Binder Sleeve-Guide To Operations (US version) - P/N 1686370  
 Problem Determination Procedures - P/N 1686437  
 Operator's Quick-Reference - P/N 1686451  
 Sharing Feature Installation Instructions - P/N 1686407  
 System 36/38 Attachment Feature Installation Instructions - P/N 1686422  
 Using The Pageprinter (3812) with System/38/36 - P/N 4588089

**US English B/M Ship Group (P/N 1686372):** This bill of materials will contain the following items.

Guide To Operations - P/N 1686348  
 Binder-Guide To Operations - P/N 1686369  
 Binder Sleeve-Guide To Operations - P/N 1682370  
 Problem Determination Procedures - P/N 1686435  
 Operator's Quick-Reference - P/N 1686450

This is a local substitution in this B/M by Jarfalla. This B/M is released with the US version of the binder sleeve P/N 1686370.

**Japanese B/M Ship Group (P/N 1686375):** This bill of materials will contain the following items.

Setup Instructions - P/N 1686327  
 Guide To Operations - P/N 1686355  
 Binder-Guide To Operations - P/N 4588045  
 Binder Sleeve-Guide To Operations (US version) - P/N 1686370  
 Problem Determination Procedures - P/N 1686442  
 Operator's Quick-Reference - P/N 1686452

Sharing Feature Installation Instructions - P/N 1686412  
System 36/38 Attachment Feature Installation Instructions -  
P/N 1686427  
Using The Pageprinter (3812) with System/38/36 - P/N 4588094

**Spanish B/M Ship Group (P/N 1686384):** This bill of materials will contain the following items.

Setup Instructions - P/N 1686324  
Guide To Operations - P/N 1686352  
Binder-Guide To Operations - P/N 4588042  
Binder Sleeve-Guide To Operations (WT version) - P/N  
6192358  
Problem Determination Procedures - P/N 1686439  
Operator's Quick-Reference - P/N 4588080  
Sharing Feature Installation Instructions - P/N 1686409  
System 36/38 Attachment Feature Installation Instructions -  
P/N 1686424  
Using The Pageprinter (3812) with System/38/36 - P/N 4588091

**Note:** The following items are not translated and are available only in English:

IBM 3812 Pageprinter Programming Reference, S544-3268  
IBM 3812 Pageprinter Programming Reference Enhanced  
Support, S544-3486  
Customer Response Card - P/N 1686336  
Maintenance Information - P/N 1686337 (composite)  
Standard Maintenance Information - P/N 1686338  
Binder - P/N 1686344  
Binder Sleeve - P/N 1686340  
Vinyl Slipcase - P/N 1686485

**Paper Handling:** Legal-, letter-, A4-, B5-, and executive-size paper from 178 x 267mm to 216 x 356mm (7.0 x 10.5 in. to 8.5 x 14.0 in.) may be fed under program control from either of the two input cassettes. Paper weights from 60 - 90gm/sq.m (16 to 24 lbs.) may be used. Xerographic paper is recommended.

Gummed labels can be automatically fed from the secondary paper cassette. The primary paper cassette holds 550 sheets of 75gm/sq.m (20-lb.) paper; the secondary paper cassette holds up to 250 sheets of 20-lb. paper. The output tray holds 550 sheets of 20-lb. paper. The output tray may be jogged one-half inch between jobs under program control. The output is delivered face-down, in sequential order.

When using gummed labels, no more than 30 label sheets should be placed in the alternate cassette.

**Relative Humidity Effects on Paper Handling:** When the Pageprinter is operating in environments where the relative humidity is above 65 percent, print quality and paper handling may be degraded when paper is left in the cassette for extended periods of time (12 hours or more).

When the relative humidity is in the area of 8 - 15 percent, paper handling is also affected due to static electric attraction in the exit tray and input cassette. Leaving paper in the cassette helps to correct this situation.

An optional Heated Cassette Kit (#3070) is available (at a charge) if relative humidity is causing significant paper handling problem.

**Performance:** The 3812 prints at speeds of up to 12 pages per minute for letter size pages, and up to 9.6 pages per minute for legal size pages. Actual speed can be significantly affected by the application and host programming support. (See "Forms Design Reference Guide for Printers", GA31-3488, for forms-design considerations.)

**Fonts, Graphics and Special Characters:** The 3812 will print the 5152 data stream of characters, logos, and business graphics for existing programs written for the 5152-2.

**Standard Operational Diskette:** One US diskette will be shipped with the 3812. The country that orders the 3812 will determine if any additional diskettes (US, Language Group 1, 2, or 4) will be shipped with the Pageprinter. These must be specified on the order. Fonts contained on each of the four diskettes are listed below.

Additional programming on the Personal Computer may be required to take advantage of the non-5152 emulation fonts.

The PC-ASCII diskettes are:

US - Latin  
Language Group 1 - Nordic, Icelandic, Portuguese and Latin  
Language Group 2 - Arabic and Latin  
Language Group 4 - Hebrew and Latin

Pageprinter Fonts with an asterisk (\*) following, contain international character sets of 221 printable characters (Code Page 850), while the other Latin fonts contain a subset of the international character set.

	Model 1				Model 2			
	US	LG1	LG2	LG4	US	LG1	LG2	LG4
Arabic (Code Page 864)								
8-pitch Kateb			X				X	
10-pitch Courier			X				X	
P.S.-Yasmin			X				X	
P.S.-Yasmin-Expanded			X				X	
Hebrew (Code Page 862)								
10-pitch Shalom	X			X	X			X
12-pitch Shalom	X			X	X			X
15-pitch Shalom	X			X	X			X
P.S.-Barak	X			X	X			X
Icelandic (Code Page 861)								
10-pitch Courier		X				X		
Nordic (Code Page 865)						X		
10-pitch Courier						X		
Portuguese (Code Page 860)								
10-pitch Courier		X				X		
Latin								
5152 Emulation: (Code Page 437)								
5-pitch Courier								
Ultra-Expanded	X	X	X	X	X		X	X
5-pitch Courier								

## MACHINES

Ultra-Expanded Bold	X	X	X	X	X		X	X
10-pitch Courier	X	X	X	X	X	X	X	X
10-pitch Courier Bold	X	X	X	X	X		X	X
17-pitch Courier								
Ultra-Condensed	X	X	X	X	X		X	X
17-pitch Courier								
Ultra-Condensed Bold	X	X	X	X	X		X	X
17-pitch Courier								
Subscript/Superscript	X	X	X	X	X		X	X

### Non-5152 Emulation:

#### 10-pitch fonts:

APL	X	X	X	X	X	X	X	X
Courier*	X	X	X	X	X	X	X	X
Courier Italic	X	X	X	X	X		X	X
Gothic Bold	X	X	X	X	X	X	X	X
Gothic Text	X	X	X	X	X	X	X	X
Katakana	X			X	X			X
Orator	X	X	X	X	X		X	X
Orator Bold	X		X	X	X		X	X
Prestige Pica*	X	X	X	X	X	X	X	X
Roman Text	X		X	X	X	X		X
Serif Italic	X	X	X	X	X	X	X	X
Serif Text	X	X	X	X	X	X	X	X
Math Symbol	X	X	X	X	X	X	X	X
OCR-A (1)	X	X	X	X	X	X	X	X
OCR-B (1)	X	X	X	X	X	X	X	X

#### 12-pitch fonts:

Courier	X	X	X	X	X		X	X
Gothic Bold	X	X	X	X	X	X	X	X
Gothic Italic	X	X	X	X	X	X	X	X
Gothic Text	X	X	X	X	X	X	X	X
Letter Gothic*	X	X	X	X	X	X	X	X
Letter Gothic Bold*	X	X	X	X	X	X	X	X
Prestige Elite*	X	X	X	X	X			X
Prestige Elite Bold*	X	X	X	X	X	X	X	X
Prestige Elite Italic*	X	X	X	X	X	X	X	X
Script	X	X	X	X	X			X
Serif Bold	X	X	X	X	X	X	X	X
Serif Italic	X	X	X	X	X	X	X	X
Serif Text	X	X	X	X	X	X	X	X
Math Symbol	X	X	X	X	X	X	X	X

#### Other fixed-pitch fonts:

13-pitch Gothic Text(2)	X	X	X	X	X	X	X	X
15-pitch Gothic Text(2)	X	X	X	X	X	X	X	X
15-pitch Gothic								
Text semi-condensed	X	X	X	X	X		X	X
15-pitch Serif Text	X		X	X	X			X
20-pitch APL	X		X	X	X			X
20-pitch Gothic Text(2)	X	X	X	X	X	X	X	X
27-pitch Gothic Text	X	X	X	X	X			X

#### Proportionally spaced fonts:

Boldface*	X	X	X	X	X	X	X	X
Boldface Italic*	X	X	X	X	X	X	X	X
Document*	X	X	X	X	X	X	X	X
Essay*	X	X	X	X	X	X	X	X
Essay Bold*	X	X	X	X	X	X	X	X
Essay Italic*	X	X	X	X	X	X	X	X
Essay Light*	X	X	X	X	X	X	X	X
Gothic Tri-pitch	X		X	X	X	X		X

#### Nordic (3):

5-pitch Courier								
Ultra-Expanded		X				X		
5-pitch Courier								
Ultra-Expanded Bold		X				X		
10-pitch Courier		X				X		
10-pitch Courier Bold		X				X		
17-pitch Courier								

Ultra-Condensed	X	X
17-pitch Courier		
Ultra-Condensed Bold	X	X
17-pitch Courier		
Subscript/Superscript	X	X

Typographic Fonts (8 fonts) (4):

8-point Sonoran Serif (5)								
Roman Medium	X	X	X	X	X	X	X	X
10-point Sonoran								
Serif Italic Medium	X	X	X	X	X	X	X	X
10-point Sonoran								
Serif Roman Medium	X	X	X	X	X	X	X	X
10-point Sonoran								
Serif Roman Bold	X	X	X	X	X	X	X	X
12-point Sonoran								
Serif Roman Medium	X	X	X	X	X	X	X	X
16-point Sonoran								
Serif Roman Bold	X	X	X	X	X	X	X	X
18-point Sonoran								
Serif Roman Bold	X	X	X	X	X	X	X	X
24-point Sonoran								
Serif Roman Bold	X	X	X	X	X	X	X	X

**BSC Feature Operational Diskette:** Diskette shipped with the Bisync Communications feature contains all the fonts listed above. When the Pageprinter is used with "VM3812 -- 3812 VM Support" (5798-DTE), fonts are part of that program offering. (VM3812 does not use the fonts on the BSC Feature Operational Diskette. See "VM3812 Users Guide" for complete listing of these fonts.) This VM3812 set of fonts contains the same fonts already available on both the 3800 Model 3 and the 3820 Pageprinter. For samples of these fonts, refer to "3800 Model 3 Font Catalog", SH30-0053.

**RT PC Feature Operational Diskette:** The Pageprinter RT PC Operational Diskette shipped with the RT PC Feature provides the fonts listed below.

Pageprinter Fonts with an asterisk (\*) following, contain the full international character sets of 189 characters (Code Page 500), while the other Latin fonts contain a subset of the international character sets.

	Model 1 US	Model 2 US
Latin		
5152 Emulation: (Code Page 437)		
5-pitch Courier		
Ultra-Expanded	X	X
5-pitch Courier		
Ultra-Expanded Bold	X	X
10-pitch Courier	X	X
10-pitch Courier Bold	X	X
17-pitch Courier		
Ultra-Condensed	X	X
17-pitch Courier		
Ultra-Condensed Bold	X	X
17-pitch Courier Subscript/Superscript	X	X
Non-5152 Emulation:		
10-pitch fonts:		
APL	X	
Courier*	X	X
Courier Italic	X	X
Gothic Bold	X	X
Gothic Text	X	X
Orator	X	X
Orator Bold	X	X
Prestige Pica*	X	X
Roman Text	X	X
Serif Italic	X	X
Serif Text	X	X
OCR-A (1)	X	X

OCR-B (1) X X

12-pitch fonts:

Courier	X	X
Gothic Bold	X	X
Gothic Italic	X	X
Gothic Text	X	X
Letter Gothic*	X	X
Letter Gothic Bold*	X	X
Prestige Elite*	X	X
Prestige Elite Bold*	X	X
Prestige Elite		
Italic*	X	X
Script	X	
Serif Bold	X	X
Serif Italic	X	X
Serif Text	X	X

Other fixed-pitch fonts:

13-pitch Gothic Text	X	
15-pitch Gothic		
Text (2)	X	X
15-pitch Serif Text	X	X
20-pitch APL	X	
20-pitch Gothic		
Text (2)	X	X
27-pitch Gothic Text	X	X

Proportionally spaced fonts:

Boldface*	X	X
Boldface Italic*	X	X
Document*	X	X
Essay*	X	X
Essay Bold*	X	X
Essay Italic*	X	X
Essay Light*	X	X

Typographic Fonts (8 fonts) (4):

8-point Sonoran Serif(5)		
Roman Medium	X	X
10-point Sonoran		
Serif Italic Medium	X	X
10-point Sonoran		
Serif Roman Medium	X	X
10-point Sonoran		
Serif Roman Bold	X	X
12-point Sonoran		
Serif Roman Medium	X	X
16-point Sonoran		

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Serif Roman Medium	X		
18-point Sonoran			
Serif Roman Bold	X	X	
24-point Sonoran			
Serif Roman Bold	X	X	

Ultra-Condensed Bold	X	X	X
17-pitch Courier			
Sub-Superscript	X	X	X
20-pitch Gothic Text	X	X	X
27-pitch Gothic Text	X	X	X

**System/36/38 Feature Operational Diskette:** The Pageprinter System/36/38 Feature Operational Diskette shipped with the System/36 and System/38 Attachment Feature provides the fonts. Latin fonts with an asterisk (\*) following, contain the full international character sets of 189 characters (Code Page 500), while the other Latin fonts contain a subset of the international character sets.

The diskettes are:

US - Latin  
Language Group 2 - Arabic and Latin  
Language Group 4 - Hebrew and Latin

	US	LG2	LG4
Arabic			
8-pitch Kateb		X	
10-pitch Kateb		X	
P.S.-Yasmin		X	
P.S.-Yasmin-Expanded		X	

Hebrew			
10-pitch Shalom	X		X
12-pitch Shalom			X
15-pitch Shalom			X
P.S.-Barak	X		X

### Latin

10-pitch fonts:			
Courier*	X	X	X
Courier Bold	X	X	X
Courier Italic	X	X	X
Gothic Bold	X	X	X
Gothic Text	X	X	X
Katakana	X		
Orator	X	X	X
Orator Bold	X	X	
Prestige Pica*	X	X	X
Roman Text	X		
Serif Italic	X	X	
Serif Text	X	X	
OCR-A (1)	X	X	X
OCR-B (1)	X	X	X

12-pitch fonts:			
Courier	X	X	X
Gothic Bold	X	X	X
Gothic Italic	X	X	X
Gothic Text	X	X	X
Letter Gothic*	X	X	X
Letter Gothic Bold*	X	X	X
Prestige Elite*	X	X	X
Prestige Elite Bold*	X	X	X
Prestige Elite Italic*	X	X	X
Script	X	X	X
Serif Bold	X	X	X
Serif Italic	X	X	X
Serif Text	X	X	X

### Other fixed-pitch fonts:

5-pitch Courier			
Ultra Expanded Bold	X	X	X
13-pitch Gothic Text	X	X	X
15-pitch Gothic Text	X	X	X
15-pitch Serif Text	X		
17-pitch Courier			
Ultra-Condensed	X	X	X
17-pitch Courier			

### Proportionally spaced fonts:

Boldface*	X	X	X
Boldface Italic*	X	X	X
Document*	X	X	X
Essay*	X	X	X
Essay Bold*	X	X	X
Essay Italic*	X	X	X
Essay Light*	X	X	X

### Typographic Fonts (7 fonts) (4):

8-point Sonoran			
Serif (5) Roman Medium	X	X	X
10-point Sonoran			
Serif Italic Medium	X	X	X
10-point Sonoran			
Serif Roman Medium	X	X	X
10-point Sonoran			
Serif Roman Bold	X	X	X
12-point Sonoran			
Serif Roman Medium	X	X	X
16-point Sonoran			
Serif Roman Medium	X	X	X
24-point Sonoran			
Serif Roman Bold	X	X	X

### Notes:

1. The Pageprinter prints the OCR-A and OCR-B fonts with the same high quality as other type styles. IBM has tested these fonts, but IBM does not warrant and has not tested that these characters are readable by all OCR Reading devices. Users of fonts should test read-write compatibility before implementing the Pageprinter for OCR applications.
2. These fonts contain international character sets of 221 printable characters (code page 850), enhanced support (Model 2) diskettes only.
3. The Language Group 1 diskette defaults to the Latin 5152 emulation fonts modified against code page 865 for Model 1 and code page 850 for Model 2.
4. These fonts have data derived under license from the Monotype Corporation PLC.
5. A functional equivalent of Monotype(R) Times New Roman(R), a trademark of the Monotype Corporation PLC. Contains data derived under license from the Monotype Corporation PLC.

The code pages supported are: 037, 259 (Symbols), 273, 274, 275, 277, 278, 280, 281, 282, 284, 285, 297, 340 (OCR), 420 (Arabic), 424 (Hebrew), 500, and 871 (Icelandic). Support of these code pages does not imply that all the graphics in the code page are available in all fonts.

**DisplayWrite 3 and Virtual Device Interface Support:** The IBM PC Program Product, DisplayWrite 3, Version 1.0, has implemented multiple font selection for the announced 10, 12, and 15 pitch fonts up to a total of 17 different fonts.

The IBM PC Program Product, DisplayWrite 3, Version 1.1 has implemented additional functions to support proportional spaced fonts and offers up to a total of 26 different fonts.

The printer tables (PDTs/PFTs) required for the capabilities contained in DisplayWrite 3 (Versions 1.1); DisplayWrite 4 (Version 1.0) are provided at no charge for those Pageprinters ordered for PC attachment on the "3812 PC Aid" diskette (P/N 1696692), shipped with each printer.

A device driver is provided on the "3812 PC Aid" diskette to allow the Pageprinter to attach to those program products written to the virtual device interface (VDI). (A virtual device interface allows applications to run unchanged on a variety of supported graphic devices.)

Font selection is also provided by the Pageprinter (3812) Driver program offering. The "Pageprinter (3812) Programming Reference", S544-3268, gives further information on font selection techniques.

### TECHNICAL INFORMATION

#### Hardware Requirements

##### IBM Personal Computer Attachment:

	P/N	Feature
PC with asynch serial adapter card	1502074	#2074
PC/XT with asynch serial adapter card	1502074	#2074
PC/AT with serial/parallel adapter card	6450215	#0215
PC Portable with asynch serial adapter card	1502074	#2074
3270 PC with asynch serial adapter card	1502074	#2074
3270 PC AT with serial/parallel adapter card	6450215	#0215

RT PC with asynch serial adapter with Direct Memory Access standard feature.

Personal System/2 with standard features.

##### Processors for VM attachment:

##### 370 family (Models 138 through 168)

303X  
4321  
4331  
4341  
4361  
4381  
308X  
309X

Controllers: Operable at speeds to 19.2K bps full-duplex or half-duplex nonswitched lines running under EP or PEP.

3705 Communication Controller  
3725 Communication Controller  
4321 via ICA  
4331 via ICA  
4361 via ICA

System/36, System/38 and 5294 Attachment: System/36 and System/38 Attachment Feature

- Microcode diskette
- Twinaxial connector module (which provides self-termination and cable through capabilities)

**Hardware Compatibility:** The 3812 is equipped with an RS-232-C serial interface and is designed to be hardware compatible to the IBM PC, PC/XT, PC/AT, Personal System/2, RT PC, 3270-PC, 3270 Personal Computer AT, and PC Portable. An RS-422 interface is also available on the 3812.

The words "hardware compatible" mean that the host system RS-232-C interface is logically compatible with the 3812 interfaces, and the host system is capable of generating a data stream (i.e., control codes and character codes) which is properly interpreted by the 3812.

Testing of customer applications which involve specific non-IBM personal computers and their related software is the customer's responsibility.

The 3812 when attached to the System/36 or System/38 or 5294 with Feature Code #3015, communicating to the System/36 or System/38, emulates the 5219 printer. All 5219 fonts are supported, however several are simulated. DisplayWrite/36 allows the use of all the Pageprinter 10, 12, and 15 pitch and proportionally spaced fonts. Additional programming using PRPQ P84073 (5799-BYX) "System/36 Printer Applications Program Interface" is required for RPG, COBOL and Assembler programs on the System/36 to make use of all fixed pitch and typographic fonts. The System/38 Office/38 Personal Services/38 provides support for all Pageprinter fixed pitch and proportionally spaced fonts. Typographic fonts may be selected for an entire Personal Services/38 document through use of CL commands. All fixed pitch fonts are available to all other S/38 applications. For more information, see "Using the IBM Pageprinter (3812) with an IBM System/36 or System/38", S544-3343.

The 5219 is a serial printer and does not support image, vector capabilities of the Pageprinter; the 3812 emulating the 5219 does not support image, vector graphics, or Enhanced function capabilities. Some models of the 5219 print envelopes; the 3812 does not. The 5219 can print on continuous forms through use of a forms tractor; the 3812 is a page printer and uses cut-sheet paper or forms. The 5219 allows paper to be rotated in the input trays; the 3812, under program control, electronically rotates the print.

**Software Compatibility:** The following software products were tested with the 3812. Only a specific level of each software product was tested. Other levels of the same software product may operate differently, and therefore may or may not function properly with the 3812. Proper function of these software products does not imply proper function of any other software product.

The control codes for the 3812 are consistent with those used on the IBM Personal Computer Graphics Printer. This means that much of the software written for use with this printer will function properly with the 3812. The words "function properly" mean that the 3812, using its supported features, in general gives the type of output expected from the software.

Pageprinter/IBM Graphics Printer (5152-2) differences: On the 3812, lines that exceed page width are truncated (no line wrap).

Without the optional 3812 Pageprinter Driver, some applications may require the user to send a form feed to print the last page (reference "IBM Pageprinter (3812) Guide to Operations", S544-3267).

The words "function properly" do not imply that the software takes full advantage of all the features and capabilities of the 3812 (e.g., Vector Graphics and paper tray selections).

Extensive testing was done with each software product listed. Due to the complexity of the software, however, it is unlikely that every case was tested. Therefore, "proper function" refers only to cases tested by IBM on each software product.

The IBM licensed software programs listed below "function properly" with the 3812 when running on properly configured IBM personal computers with the RS-232-C serial asynchronous interface.

Some functions of the 3812 may not be supported by these software offerings (e.g., fonts, images or vector graphics). Additional programming may be required by the user to take advantage of these Pageprinter capabilities.

**3812 Support of Advanced Function Printing:** Many print files created for the 3820 Page Printer and the 3800 Model 3 Printing Subsystem can be printed without change on the 3812 using the VM3812 Program Offering. (Note: See Program Offering.)

"VM3812 - IBM 3812 Pageprinter VM Support Applications Programmer's Guide", SH20-6732.

**Software Requirements:** The 3812 operates on IBM Personal Computers with the following:

#### Operating Systems and Languages:

DOS 2.0 with BASIC  
DOS 2.1 with BASIC  
DOS 3.0 with BASIC  
DOS 3.1 with BASIC

IBM Professional FORTRAN compiler

For 3270 PC, native DOS or under 3270 PC Control Program:

Models	Version	P/N	Feature
2, 4, 6	1	1837434	#1505
2, 4, 6	2	6217355	#3005
24, 26	1.2.2	6423236	#3010

For 3270 Personal Computer AT native DOS or under 3270 Personal Computer AT Control Program, Version 2.1: Models 020, 041, 042, 061, and 062 (P/N 6217355, feature #3005).

#### Application Packages (tested under DOS 3.1):

PC Network Printserver:

PC Network - PC Network Program  
IBM Token-Ring Network - PC Network Program

#### Application Packages (tested under DOS 2.0 or 2.1):

- DisplayWrite 1 1.0 (as class A printer only)
- DisplayWrite 2 1.1 (as class A printer only)
- DisplayWrite 3 1.0 (as class A and class F printer)
- DisplayWrite 3 1.1 (as class A and class F printer)
- DisplayWrite 4 1.0 (Tested under DOS 2.1 and 3.2)
- Personal Editor 1.0
- Professional Editor 1.0
- Wordproof 1.0
- Script/PC 1.0
- IBM Writing Assistant 1.0
- IBM Filing Assistant 1.0
- IBM Reporting Assistant 1.0
- IBM Graphing Assistant 1.0
- IBM Personal Decision Series:
  - Data Edition 1.0
  - Words Edition 1.0
  - Reports + 1.0
  - Graphs Edition 1.0
  - Plans Edition 1.0
  - Plans + Edition 1.0
  - Data Training Edition 1.0
  - Mailing Labels Edition 1.0
  - Prospect Tracking Edition 1.0
  - Client Time/Cost Accounting Edition 1.0
  - Asset Catalog Edition 1.0
  - Appointment Calendar Edition 1.0
- Diskette Librarian
- IBM Business Management Series:
  - Accounts Payable Edition 1.0
  - Accounts Receivable Edition 1.0
  - General Ledger Edition 1.0
  - Inventory Accounting Edition 1.0
  - Order Entry and Invoicing Edition 1.0
  - Payroll Edition 1.0
- IBM Training Editions:
  - Accounts Payable Edition
  - Accounts Receivable Edition
  - General Ledger Edition
  - Inventory Accounting Edition
  - Order Entry and Invoicing Edition
  - Payroll Edition
- Multiplan 1.1

**Software Support:** The 3812 has been tested under DOS 2.0 and 2.1 on IBM Personal Computers with the following software offerings. The country offerings tested are shown in parentheses.

- DisplayWrite 1 (FR, GE, IT, SP)
- DisplayWrite 2 (FR, GE, IT, SP, UK, Arabic)
- IBM Homeword (GE, IT, SP, UK, DUT, DAN)
- IBM Filing Assistant (FR, GE, IT, SP, UK)
- IBM Graphing Assistant (FR, GE, IT, SP, UK)
- IBM Planning Assistant (UK)
- IBM Reporting Assistant (FR, GE, IT, SP, UK)
- IBM Writing Assistant (FR, GE, IT, SP, UK)
- IBM Topview (UK, WW)

- IBM PC Network - PC Network Program (GE, IT, SP, UK)
- IBM Basic Primer (FR, IT)
- Exploring the IBM PC Network (FR, GE, IT, SP, UK)
- Exploring the IBM PC Portable (FR, GE, IT, SP, UK)
- Exploring the IBM PC/AT (FR, GE, IT, SP, UK)
- IBM PC Network Program (GE, IT, SP, UK)
- IBM Videotext Terminal Support (UK)
- IBM SNA 3270 Emulation and RJE - National Language Support (UK)
- Multiplan (FR, GE, IT, SP, UK)

**Vendor Logo Applications:** Listed below are Vendor Logo Program Offerings previously released by IBM. IBM has analyzed these DOS-based programs and determined that in their current form as distributed by IBM, they will print as expected by the 3812. IBM does not guarantee that equivalent results will be obtained from future releases of these programs.

- Easywriter (FR, GE, IT, NL, SP) (note 1)
  - F.T. Moneywise (UK) (note 2)
  - DCA Decision Support Interface (UK) (note 3)
  - Pertmaster 1000 (UK) (note 4)
  - Pertmaster 2500 (UK) (note 4)
  - Torus Tapestry Manager (UK) (note 5)
  - Torus Tapestry Workstation (UK) (note 5)
1. Trademark of Information Unlimited Software, Inc.
  2. Trademark of Moneywise Software Limited.
  3. Trademark of Digital Communications Associates, Inc.
  4. Trademark of Pertmaster Corporation.
  5. Trademark of Torus Corporation.

See additional hardware and software requirements in "Program Offering Support" section.

**System/36 and System/38 Attachment Feature:** The System/36 and System/38 Attachment Feature (P/N 1348409, Feature #3015) is supported by release 3 System/36 (5360 and 5362), release 5 System/36 (5364) and release 7 System/38 program products.

**VM Support:** In addition to supporting the IBM PC, PC/XT, PC/AT, 3270-PC, RT PC, 3270 Personal Computer AT, and PC Portable through the RS-232-C serial attachment, VM users may send print output to the IBM Pageprinter via the bisync RS-232-C attachment and the 3812 Pageprinter VM Support program offering. The 3812 Bisync Communications feature (P/N 1348496, #3060) is required.

Applications running under VM such as DCF release 3 and GDDM release 3 or 4 can take advantage of the speed, print quality, and all points addressability of the 3812. This attachment does not support vector graphics capability.

For example, these kinds of files can be printed:

- LIST38PP (DCF Release 3, etc.) - Documents formatted for 3800 and 3820.
- Documents formatted by DCF Release 3 or Interactive Composition and Editing Facility (ICEF/2) for the 4250 and processed by PROOFPRNT Utility.
- Document formatted by ICEF/2 for the 3800 Model 3
- LISTING (CMS Listing Files)
- PRINT (CMS Printer Files)
- PRINT38 (3800 Model 1 Files)
- Drawings generated by GDDM for the 3800 or 3820.
  - GDQF - Graphical Data and Query Facility
  - ICU - Interactive Chart Utility
  - IPG - Interactive Presentation Graphics
  - Composition Utility
- Canonical Images (black and white bit images) created by:
  - GDDM - 240 dpi resolution
  - Scanner
- Electronic overlays can be prepared using Overlay Generation Language (OGL) in MVS and sent to CMS files to be processed by VM3812.
- Documents can be sent to a PC for subsequent printing offline on a 3812.

**Communication Facilities:** The 3812 operates in half-duplex point-to-point mode on half-duplex or full duplex facilities using

BSC, at a transmission rate of up to 19,200 bps (with a modem supplied clock) on nonswitched facilities.

**Modems:** Unless the 3812 will be directly connected, an external Data Circuit Terminating Equipment (DCE) is required, (e.g., in the VM environment). The 3812 has been tested to operate with the 3865-2, 5865, 5866, 5811, 5812 modems. (See M2700 pages).

**Communication Interfaces:** Provides a V.24 interface for attachment to an external IBM modem or PTT mandatory modem complying with CCITT Recommendation V.24, V.28 ISO Standard 2110 and other relevant CCITT Recommendations. Attachment to non-IBM modems or other DCEs is subject to the provision of the Multiple Supplier Systems Bulletin.

**Printer Sharing Card:** The Printer Sharing Card (P/N 1348408, feature #3115) allows attachment of the 3812 to up to eight PCs (any mix of IBM PC, PC/XT, PC/AT, and PC Portable). The IBM PC/DOS Pageprinter Driver program offering (P/N 6466981, feature #9623) is for use with the Sharing Card as it provides job separators, paper cassette selection, output jogging and font selection. A separate license is required for each personal computer.

For cable specifications and pre-assembled cable sizes, see "Introduction and Planning Guide", G544-3265.

**PC Network and IBM Token-Ring Network Environments:** A sharing card may not be used in these environments. The 3812 emulates the IBM Graphics Printer (5152-002). Use of the Pageprinter (3812) Driver Program (P/N 6466981, feature #9623) in non-print server workstations will provide menu-driven font selection, paper drawer selection and job separation. The 3812 attaches to a network print server PC, thus providing letter-quality print and graphics support for all network users. See Programming Announcement dated August 14, 1984 for details on PC Network requirements; and Programming Announcement dated October 15, 1985, for IBM Token-Ring Network information.

**Program Offering Support:** The following Program Offerings will be available at General Availability to support the 3812 Pageprinter:

- IBM PC/DOS 3812 Pageprinter Driver Program (P/N 6466981, #9623), required with PC Sharing Card environments.
    - Allows data rates up to 9.6K bps (19.2K bps on Personal System/2)
    - Automatic background print buffer (when printer online to host)
    - Print option selection via full-screen menu:
      - ▲ Multiple fonts
      - ▲ Different page format options
      - ▲ Status of queued jobs
    - Maintains job boundaries for Sharing Card option.
    - Separate license needed for each PC attached to the sharing card.
    - Operating Environment
  - Runs on IBM PC, PC/XT, PC/AT, PC Portable:
    - ▲ 256Kb Memory minimum
    - ▲ One diskette drive
  - Runs in a shared environment with IBM PC, PC/XT, PC/AT, and PC Portable:
    - ▲ 256Kb memory minimum
    - ▲ One diskette drive
  - Will optionally display 3812 operator messages at the PC.
  - For further information see the Availability Notice, G320-0819
- 3812 Font Managers
  - 3812 Pageprinter VM Support (5798-DTE):
    - Line printer emulation
    - Allows All Points Addressable printing
    - BSC attach.
    - Operating environment:
      - ▲ IBM S/370, 43XX, 303X, 308X, 309X, 937X family of CPUs

- ▲ VM SP3, SP4 or VM/SP-Entry and HPO 3.2 or greater
- ▲ BISYNC up to 19.2K bps
- ▲ 3705/3725 communications control unit
- ▲ 4331, 4361 ICA, 4321
- ▲ 3812 BISYNC Communications feature (P/N 1348496, feature #3060)
- For additional information see Availability Notice G320-0799

Defect Service will be available until December 31, 1987, at which time it will be withdrawn without written notice.

The mailing address for APARs is:

IBM Corporation  
IPS Product Support Center  
P.O. Box 152560  
Irving, TX 75015-2560

An "800" number will be provided to users to call for defect-related service.

**IBM Graphics Printer (5152-2):** Unlike the IBM Graphics Printer (5152-2) the 3812 attaches as on the serial port. Additional new functions offered by the Pageprinter are:

- Letter-quality print (240 x 240 dots per inch)
- 12 pages per minute maximum
- Vector graphics support
- Zero, 90, 180, and 270 degree print orientations
- Alternate paper cassette
- Cut-sheet input
- Gummed labels
- Offset, sequential output
- Lower noise level

There is one difference between 3812 and IBM Graphics Printer output. On the Pageprinter, lines that exceed page width are truncated (no line wrap).

### SYSTEM PLANNING CONSIDERATIONS

**Service Space Envelope:** The support surface must be rigid, stable, and capable of supporting 60kg (141 lbs.). The minimum height is 660mm (26 in.), the maximum height is 914mm (36 in.). Either a stationary or movable support is acceptable.

**Stationary Support:** If carpeting or the condition of the floor make moving the support difficult, a stationary support is required. If the printer can slide on the surface of the stationary support, the support surface must be no smaller than 915mm (36 in.) wide by 710mm (28 in.) deep. Such a support requires the following floor space:

Height: 2,032mm (80 in.)  
Width: 1,448mm (57 in.)  
Depth: 1,473mm (58 in.)

If the printer cannot slide easily on the support surface, the support surface must be no smaller than 690mm (27 in.) wide by 480mm (19 in.) deep and no larger than 1,295mm (51 in.) by 1,092mm (43 in.).

A minimum of 760mm (30 in.) is required around the front and both sides of the support surface. A minimum of 915mm (36 in.) is required at the rear.

**Movable Support:** If the support can be easily moved away from the wall, the support surface must be no larger than 1,295mm (51 in.) by 1,092mm (43 in.). In this case the following minimum floor space is required:

Height: 2,032mm (80 in.)  
Width: 1,728mm (68 in.)  
Depth: 1,930mm (76 in.)

In addition, the support surface must be no smaller than 690mm (27 in.) by 480mm (19 in.). In this case the following minimum floor space is required:

Height: 2,032mm (80 in.)

Width: 1,448mm (57 in.)  
Depth: 1,473mm (58 in.)

An optional Pageprinter Stand will be available for purchase to support the Pageprinter.

### SPECIFY

This section lists items which will be furnished when specified on an initial machine order. Unless otherwise noted, these specify features are only available at the time of manufacture. The number to the right of the item is the Feature Code.

- Voltage Group: The Voltage Group requirement is determined by the 3-digit country code. (100V, 120V, 200V, 220V, 400V): No specify.
- Frequency Group:
 

50 Hz	(100V)	1348406
50 Hz	(200V)	1348403
50 Hz	(220V)	1348405
50 Hz	(240V)	1348404
60 Hz	(100V)	1348407
- Country Group: The Country Group requirement is determined by the 3-digit country code. The Country Group contains the safety labels for the 3812 Pageprinter. No specify required.
- Language Code: The following codes are for use only when a country wishes to specify a language other than the one that is pre-assigned to a country number. These codes must be used in conjunction with the 9020 Language Specify Code.

#0073 Japanese  
#0077 Canadian French

**Power Cords:** Power cord requirements, with the exception of Chicago, are determined by the 3-digit country code and are "No Specify" items.

Australia, New Zealand	5640664
Austria, Belgium, Finland, France, Germany, Greece, Netherlands, Norway, Portugal, Spain, Sweden	6952320
Denmark	6952329
Israel	6952383
Italy	6952374
Switzerland	6952365
South Africa	6952347
Hong Kong, Ireland, United Kingdom	6952356
Argentina, Philippines, Mexico City	5640660
(cord only - plug attached locally)	
Mexico City Only - MUST SPECIFY: #9015 (final assembly and line cord for Mexico City only)	

### SPECIAL FEATURES

**System/36, System/38 Attachment Feature (#3015, P/N 1348409):** Required when attaching the 3812 to a System/36, System/36 PC, System/38 or 5294 communicating to the System/36 or System/38. The 3812 emulates the 5219 printer (Enhanced Support does not apply to the 5219 Emulation). The System/36, System/38 Attachment Feature includes an attachment card and cover that mounts on the back of the 3812; a twinaxial connector module that is self-terminating and also allows cable-through connection to other devices; a System/36, System/38 Attachment microcode and font

diskette; and the necessary publications for installing and using the feature. The attachment feature connects to the host with standard twinaxial cable and connectors or the IBM Cabling System.

**Printer Stand (#3050, P/N 1348481):** Offers convenient support for the IBM Pageprinter. Magnetic latching doors provide access to supplies storage. Pearl White baked enamel finish matches the 3812 and blends well into any environment. 4 casters feet make it easy to relocate stand and printer. Dimensions: 686 x 544 x 660mm (27 x 21.5 x 26 in.). Gross shipping weight: 2x kg (60 pounds).

**Blasync Communications (#3060, P/N 1348496):** Required when attaching the 3812 to a 3705, 3725 or ICA for VM support via program offering 5798-DTE.

**Feature Fonts:** These program products provide proportionally spaced, typographic fonts for use with the 3812. They are digitized at 240 x 240 dots (pels) per square inch and are licensed to IBM. Each of these five optional 3812 Pageprinter Feature Font groups is available for a one-time charge. In order to use these Feature Fonts on the Pageprinter, the 3812 Pageprinter VM Support (5798-DTE) program offering must be installed. The 3812 VM program will download the fonts from the host to the IBM Pageprinter "as needed". These Feature Fonts are not available for the Pageprinter when attached in a PC-only installation or when attached to the System/36 and System/38.

**Printer Sharing Card (#3115, P/N 1348408):** Allows attachment of the 3812 to up to 8 PCs (any mix of IBM PC, PC/XT, PC/AT, PC Portable). The IBM PC/DOS Pageprinter Driver program offering (P/N 6466981) is required for use with the Sharing Card as it provides job separators, paper cassette selection, regular and alternate fonts and improves printer utilization in the multiple-user environment.

**RT PC System Attachment (#3155, P/N 1696683):** Machine requirements:

- IBM Personal Computer Attachment
  - PC, PC XT, 3270 PC and Portable PC, each equipped with an Asynchronous Communications Adapter (#2074)
  - PC AT or 3270 Personal Computer AT, each equipped with a Serial/Parallel Adapter (#2015)
- IBM Processors for VM Attachment:
  - System/370 Models 138 through 168
  - 303x, 308x, 3090, and 43XX processors
- Controllers -- operable at speeds up to 19.2K bps, full-duplex or half-duplex nonswitched lines, running under EP or PEP:
  - 3705 Communication Controller
  - 3725 Communication Controller
  - Communication Adapter on 4321, 4331, or 4361
- System/36, System/38, and 5294 Attachment:
  - System/36/38 Attachment Feature (#3015) on 3812
  - Microcode diskette
  - Twinaxial connector module (provides self-determination and cable-through capabilities)
- System/88 Attachment:
  - 4575 or 4576 Processor with Full Modem Asynchronous Line Adapter (#1201)

Programming Requirements: The Pageprinter 3812 Model 2 operates under the programs currently listed for the 3812.

**IBM 3270 Information Display Systems Attachment Feature (#3190, P/N 04F5278):** The 3270 Information Display Systems Attachment feature provides the hardware interface for the 3812 Model 2 Pageprinter.

Two modes of operation are supported, 3268 mode and IPDS mode. Non-GDDM/DW370 applications are supported in the 3268 mode.

Machine requirements: 3812 Model 2 Pageprinter is required for the 3270 Information Display Systems Attachment.

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Programming requirements: The system programmer should configure the system as though a 3268 were installed.

GDDM 2.1.1 must be at the latest PTF level (October 87 or Later) in order to support the 3812 Model 2 advanced print functions. Contact your service representative for assistance.

The Intelligent Printer Data Stream Reference, S544-3417-00, will assist users in adapting their applications to take advantage of the advanced printing functions offered by the 3812.

IPDS Functions	GDDM Appli- cations	DW370 Using GDDM 2.1.1
Page Size Control	X	X
Pitch Selection		
10/12/15 CPI	10 Only	X
Proportional Spacing		
Line Spacing		
3/4/6/8	8 Only	X
Variable		
Advanced Function		
Word Processing		
Underscore	X	
Overstrike		
Emphasis (Bold)	X	X
Italics		X
Super/Sub Script		
Font/Character Set	X	X
APL Character Set	X	X
Graphics		
Lines	X	
Full Arcs/Ellipse	X	
Area Fill	X(15 patterns, 8 simulated characters)	
Line Types	X	
Markers	X	
Rotated Characters	X	
Large Characters	X	
Graphics Images	X	
Images		
Overlays		
Retained Segments		
OCR A and OCR B		
Bar Code		
Features		
Resident Font Selection		X
Selectable Page Orientation		X
Graphics-DR/2 level at 240 ppi		X
Image-IO/1 level at 240 ppi		X
Selectable Input Paper Cassette		X
Alternate Offset Stacker		X

Fonts Supported:

	I	P	D	S
	USA	LG2	LG4	
Courier.10	X	X	X	
Courier.bold.10				
Prestige.10				
Gothic-text.bold.10				
Orator.10	X	X	X	
Orator.bold.10	X	X	X	
Courier.italic.10	X	X	X	
Gothic-text.10	X	X	X	
Katakana-gothic.10	X	X	X	
APL.10	X	X	X	

Courier.12	X	X	X
Gothic-text.12	X	X	X
Gothic-text.bold.12	X	X	X
Gothic-text.italic.12	X	X	X
Script.12	X	X	X
Prestige.12	X	X	X
Prestige.bold.12			
Prestige.italic.12	X	X	X
Letter-gothic.12	X	X	X
Letter-gothic.bold.12			
Boldface.PSM			
Boldface.italic.PSM	X	X	X
Essay.PSM	X	X	X
Essay.italic.PSM	X	X	X
Essay.bold.PSM			
Essay.light.PSM	X	X	X
Document.PSM	X	X	X
Gothic-text.13	X	X	X
Gothic-text.15	X	X	X
Serif-text.15			
Courier.5	X	X	X
Courier.17	X	X	X
Courier.bold.17			
Courier.17ss	X	X	X
APL.20	X	X	X
Gothic-text.20	X	X	X
Gothic-text.27	X	X	X
Sonoran-serif.8pt	X		
Sonoran-serif.10pt	X		
Sonoran-serif.12pt	X		
Sonoran-serif.bold.10pt	X		
Sonoran-serif.bold.16pt	X	X	X
Sonoran-serif.italic.10pt	X		
Sonoran-serif.bold.24pt	X	X	X
Kateb.8		X	
Kateb.10		X	
Yasmin.PS		X	
Yasmin.PS.E		X	
Shalom.10			X
Shalom.12			X
Shalom.15			X
Barak.PSM			X

### 3812 Bar Code Printing

The 3812 Pageprinter provides advanced printing capability for automatic identification (AI) applications where information must be printed in machine-readable form. With the appropriate programming support, the 3812 can produce bar code labels and documents that meet the current standards of major industry groups such as:

- Automotive Industry Action Group (AIAG)
- Department of Defense Logistics Applications of Automated Marking and Reading Symbols (LOGMARS)
- Health Industry Bar Code Council (HIBCC)
- American National Standard Institute (ANSI)
- European Article Numbering (EAN)
- Uniform Product Code Council (UPCC)

Bar Codes: The 3812 Pageprinter meets current industry standards for the following bar codes:

- Code 3 of 9
- Interleaved 2 of 5
- UPC (A/E), EAN (8/13)
- MSI Plessey
- Industrial 2 of 5
- Matrix 2 of 5

The highest densities supported for these bar codes are given below. Lower densities are also supported.

Bar code type	Average	Ratio or	Maximum
---------------	---------	----------	---------

	narrow element width (mils)	magnification	Character Density (cpi)
Code 3 of 9	13	2.00-3.00-to-1	5.92
Interleave 2/5	13	2.00-3.00-to-1	9.62
UPC/EAN	13	.98	10.99
MSI Plessey	13	2.00-3.00-to-1	6.41
Industrial 2/5	13	2.00-3.00-to-1	6.41
Matrix 2/5	13	2.00-3.00-to-1	9.62

Bar code element width is selectable in 4-mil increments within a range from 13 mils to 208 mils. The ratio of wide to narrow elements is selectable in increments within a range from 2.0-to-1 to 3.0-to-1. Bar code height is selectable in increments up to a total height of the page. Use of check digits and printing of human readable information are optional where allowed by bar code standards.

The 3812 is capable of integrating bar codes with standard text, large characters, OCR, graphics, and logos where these elements are required in formatting of labels and documents.

Customer Responsibilities: The customer is responsible for:

- Evaluation of 3812 bar code quality for application suitability, including compliance with applicable industry standards and practices.
- Keeping the printer properly maintained.
- Using quality forms and label stock.
- Replacing toner to maintain minimum print contrast signal (PCS) allowed for the user's application.

For a successful automatic identification application, the customer should be knowledgeable of industry practices and recommendations for implementing quality control procedures for monitoring the printing quality of bar code labels and documents.

Paper Limitations: For maximum bar code readability, the user should evaluate paper and label stock carefully for satisfactory printing and handling. Paper and labels should be "xerographic" type, consistent with the limitations on the base 3812.

Pressure-sensitive, adhesive-backed labels are supported; card stock is not supported.

Reader Compatibility: Bar codes printed by the 3812 are compatible with recognition equipment operating with visible (B633 nm), near-infrared (B800 nm), and infrared (B900 nm) light sources.

Software Support: 3812 bar code printing and label formatting are not supported with software utilities or applications on S/37X, but the Intelligent Printer Data Stream facilities are provided for the development of user-written applications.

**Intelligent Printer Data Stream (IPDS) (#3192, P/N 04F5280):** IPDS supports the presentation of text, images, vector graphics, bar codes and at any point on a page.

Machine requirements:

- Specified Operating Environment - System/36:
  - Hardware Requirements:
    - ▲ IBM 3812 Model 2 is required
    - ▲ System/36 Attachment - Local: Attaches to the workstation controller on the 5360, 5362 or 5364
    - ▲ System/36 Attachment - Remote: Remote attachment is via the IBM 5294 Remote Control Unit. An available workstation position and Extended Function A (#3601) is required on the 5294.
  - Software Requirements: The System/36 SSP must be at Release 5.1 or higher to support the 3812.

#### ● Specified Operating Environment - System/38:

- Hardware Requirements: 3812 Model 2 is required

- ▲ System/38 Attachment - Local: Attaches to the workstation controller on the 5380 or 5381.
- ▲ System/38 Attachment - Remote: Remote attachment is via the IBM 5294 Remote Control Unit. An available workstation position and Extended Function A (#3601) is required.
- ▲ System/36 Advanced Printer Function Licensed Program Product (5727-AP1, AP6) is not supported on the 3812 Pageprinter.
- ▲ System/38 Advanced Printer Function Utility Licensed Program Product (5714-UT2) is not supported on the 3812 Pageprinter.
- ▲ The maximum size of an image which can be printed is equivalent to a 7.5 inch x 8.5 inch page. This is based on the availability of a maximum of 450K bytes in the 3812 to hold an uncompressed image.

- Software Requirements: The System/36 SSP must be at Release 5.1 to support the 3812 IPDS feature.

Programming requirements: Programming support for the 3812 Pageprinter IPDS feature is provided by Release 5.1 of System Support Program (SSP) - Program numbers 5727-SS1 (5360 and 5362) and 5727-SS6 (5364).

Specific System/36 programming support includes:

- OCL support of 5219 compatible font selection, LPI selection, page rotation, computer output reduction and drawer selection.
- Displaywrite/36 support of font selection LPI selection, page rotation, drawer selection, bold printing, underscore, overstrike, subscript, superscript, justification and OCR A/B printing. Margin control for typographical fonts is not provided.
- BGU generated graphics printing, and also IPDS graphics files generated from other sources.
- Graphics generated by BGU, GDDM/36, and CADwrite (using the CADwrite GDF PRPQ) can be merged with Displaywrite/36 or RPG/COBOL generated output. Also, image data available in a Displaywrite/36 folder can be merged with Displaywrite/36 generated text for printing.
- Selection of printer options such as font, rotation, drawer, etc. can be made from within an RPG or COBOL program with the IPDS Advanced Functions PRPQ, 5799-CGK (5360 and 5362) and 5799-CGL (5364). In addition, these PRPQs include sub-routines which support printing of bar codes and graphics.
- MSRJE forms control of page rotation and drawer selection.

System/38 Programming Support: Programming support for the 3812 Pageprinter IPDS feature is provided by Release 8 of Control Program Facility (CPF) - 5714-SS1.

Specific System/38 programming support includes:

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- CL font selection, LPI selection, page rotation, computer output reduction, drawer selection and code page selection.
- BGU and GDDM generated graphics printing.
- DDS font selection, LPI selection, page rotation, drawer selection, code page selection, and bar code printing.

DW/36 supports full page printing on the 3812 IPDS printer from an image data file with a compression ratio of 1.5-to-1 or larger. (Nominally, compression ratios for type written pages exceed 15-to-1 and may be 20-to-1 or 30-to-1 depending on the density of the printed matter.) Images are normally stored and interchanged in compressed form. As the image compression factor approaches a ratio of 1-to-1 (or not compressed at all), the printer buffer size of 450K bytes, for temporary storage of the data stream, limits the image size to 8.5 X 7 inches. There is no restriction on where the image may be placed on the page. It is not expected that compressed image printing will be restricted by this limitation in any but the most extreme cases of continuous halftone images.

Although the 3812 Model 2 Pageprinter will print bar code images, IBM does not warrant that a specific bar code reader will be able to read the bar code images as printed. The customer is responsible for determining the acceptability of the bar codes as printed for their specific application.

	USA	I P D S LG2	LG4
Courier.10	X	X	X
Courier.bold.10	X		
Prestige.10	X	X	X
Gothic-text.bold.10	X	X	X
Orator.10	X	X	X
Orator.bold.10	X	X	X
Courier.italic.10	X	X	X
Gothic-text.10	X	X	X
Katakana-gothic.10	X	X	X
APL.10			
OCR-A	X	X	X
OCR-B	X	X	X
Courier.12	X	X	X
Gothic-text.12	X	X	X
Gothic-text.bold.12	X	X	X
Gothic-text.italic.12	X	X	X
Script.12	X	X	X
Prestige.12	X	X	X
Prestige.bold.12	X	X	X
Prestige.italic.12	X	X	X
Letter-gothic.12	X	X	X
Letter-gothic.bold.12	X		
Boldface.PSM	X	X	X
Boldface.italic.PSM	X	X	X
Essay.PSM	X	X	X
Essay.italic.PSM	X	X	X
Essay.bold.PSM	X	X	X

Essay.light.PSM	X	X	X
Document.PSM	X	X	X
Gothic-text.13	X	X	X
Gothic-text.15	X	X	X
Serif-text.15	X	X	X
Courier.5	X	X	X
Courier.17	X	X	X
Courier.bold.17	X	X	X
Courier.17ss	X	X	X
APL.20			
Gothic-text.20	X	X	X
Gothic-text.27	X	X	X
Sonoran-serif.8pt			
Sonoran-serif.10pt			
Sonoran-serif.12pt			
Sonoran-serif.bold.10pt			
Sonoran-serif.bold.16pt	X	X	X
Sonoran-serif.italic.10pt			
Sonoran-serif.bold.24pt	X	X	X
Kateb.8		X	
Kateb.10		X	
Yasmin.PS		X	
Yasmin.PS.E		X	
Shalom.10			X
Shalom.12			X
Shalom.15			X
Barak.PSM			X

### 3812 Bar Code Printing

The 3812 Pageprinter provides advanced printing capability for automatic identification (AI) applications where information must be printed in machine readable form. With the appropriate programming support, the 3812 can produce bar code labels and documents that meet the current standards of major industry groups such as:

- Automotive Industry Action Group (AIAG)
- Department of Defense Logistics Applications of Automated Marking and Reading Symbols (LOGMARS)
- Health Industry Bar Code Council (HIBCC)
- American National Standard Institute (ANSI)
- European Article Numbering (EAN)
- Uniform Product Code Council (UPCC)

Bar Codes: The 3812 Pageprinter meets current industry standards for the following bar codes:

- Code 3 of 9
- Interleaved 2 of 5
- UPC (A/E), EAN (8/13)
- MSI Plessey
- Industrial 2 of 5
- Matrix 2 of 5

The highest densities supported for these bar codes are given below. Lower densities are also supported.

Bar code type	Average narrow element width (mils)	Ratio or magnification	Maximum Character Density (cpi)
Code 3 of 9	13	2.00-3.00-to-1	5.92
Interleave 2/5	13	2.00-3.00-to-1	9.62
UPC/EAN	13	.98	10.99
MSI Plessey	13	2.00-3.00-to-1	6.41
Industrial 2/5	13	2.00-3.00-to-1	6.41
Matrix 2/5	13	2.00-3.00-to-1	9.62

Bar code element width is selectable in 4-mil increments within a range from 13 mils to 208 mils. The ratio of wide to narrow elements is selectable in increments within a range from 2.0-to-1 to 3.0-to-1. Bar code height is selectable in increments up to a total height of the page. Use of check digits and printing of human readable information are optional where allowed by bar code standards.

The 3812 is capable of integrating bar codes with standard text, large characters, OCR, graphics, and logos where these elements are required in formatting of labels and documents.

Customer Responsibilities: The customer is responsible for:

- Evaluation of 3812 bar code quality for application suitability, including compliance with applicable industry standards and practices.
- Keeping the printer properly maintained.
- Using quality forms and label stock.
- Replacing toner to maintain minimum print contrast signal (PCS) allowed for the user's application.

For a successful automatic identification application, the customer should be knowledgeable of industry practices and recommendations for implementing quality control procedures for monitoring the printing quality of bar code labels and documents.

Paper Limitations: For maximum bar code readability, the user should evaluate paper and label stock carefully for satisfactory printing and handling. Paper and labels should be "xerographic" type, consistent with the limitations on the base 3812.

Pressure-sensitive, adhesive-backed labels are supported; card stock is not supported.

Reader Compatibility: Bar codes printed by the 3812 are compatible with recognition equipment operating with visible (B633 nm), near-infrared (B800 nm), and infrared (B900 nm) light sources.

Software Support: 3812 bar code printing and label formatting are supported on S/36 via the Intelligent Printer Data Stream Advanced Functions utility PRPQ P84094 (5799-CGK) for 5360/62 and P84095 (5799-CGL) for 5364.

Bar code is supported by DDS Keywords in S38 Control Program Facility (CPF) release 8 and later.

**Cables:** Printer cable for IBM PC, PC/XT, PC Portable, 3270-PC, 3270 Personal Computer AT:

6m (#3030)  
24m (#3040)

Modem to printer cable for VM attachment:

6m (#3045)

PC/AT and 3270 Personal Computer AT to RS-232-C adapter cable (required on PC/AT and 3270 Personal Computer AT and should be ordered as a feature of the PC/AT and 3270 Personal Computer AT):

254mm (#0242 of PC/AT)

RT PC:

- Attaching 3812 to RT PC's Serial/Parallel Adapter Card (P/N 6450215, #0215) use:  
Serial Printer Cable (9-pin, 3m) P/N 6298993, #8993
- Attaching 3812 to RT PC's Native Serial Ports on Models 20 and 25 use:  
Serial Printer Cable (10-pin, 3m) P/N 6294803, #4803
- Attaching 3812 to RT PC's 4-Port Asynchronous RS-232-C Adapter Card (P/N 6294763, #4763) use:  
Serial Printer Cable (10-pin, 3m) P/N 6294803, #4803

For System/36 and System/38 Cables: IBM shielded twisted-pair cable (or equivalent) or twinaxial cable is required for attachment of the 3812. Cable and associated accessories may be purchased

from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted-Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", (GA27-3361). For pricing and ordering information, refer to the appropriate IBM DIRECT catalog.

**Twinaxial Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM 5250 Information Display System Planning and Site Preparation Guide", (GA21-9337). When cable is ordered from IBM specify a date at least four weeks in advance of receiving the machine.

**Twinaxial Connector Kit (P/N 7362268):** Includes 2 connectors. Twinaxial wire and 1 connector kit are required for each attachment cable. (Individual connectors P/N 7362229 are available for replacement.)

**Twinaxial Wire (P/N 7362211):** Order must specify the desired length. Twinaxial Wire and 1 connector kit are required for each attachment cable. (This is an indoor/outdoor cable.)

**Twinaxial Cable Assembly (P/N 7362267):** Includes a connector kit (2 connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly.

**Twinaxial Adapter (P/N 7362230):** Permits 2 Twinaxial Cable Assemblies to be joined together. Order cable via MSORDER (Category = Bulk Cable) on AAS specifying part number. Allow lead time of 120 days.

**Twinaxial Station Protector Kit (B/M 7361807)** includes 2 protectors. One is required at each end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual Twinaxial Station Protectors, P/N 7362426, are available for replacement purposes. Order via MSORDER (Category = Accessory/Supplies) on AAS specifying bill of material number. Allow a lead time of 120 days. Customer Setup: Yes.

**Twinaxial Cable** is available with Teflon(R) covering. Teflon-covered cable complies with the National Electrical Code requirements for low smoke-producing, plenum-installed cables.

**Twinaxial Connector Kit:** Includes 2 connectors. Twinaxial wire and one connector kit are required for each attachment cable. Order P/N 7362063 for Teflon-covered cable. Individual connectors P/N 7362229 are available for replacement.

**Twinaxial Wire:** Order must specify the desired length. Twinaxial wire and 1 connector kit are required for each attachment cable. Order P/N 7362061 for Teflon-covered cable.

**Twinaxial Cable Assembly:** Includes a connector kit (2 connectors) attached to bulk wire. The required length of wire must be specified on the order. The cost of the wire must be added to the fixed assembly price to obtain the total price of the cable assembly. Order P/N 7362062 for Teflon-covered cable assembly.

## SUPPLIES

Choosing the right supplies is very important for customer satisfaction with the 3812. The use of IBM supplies is recommended. The use of xerographic paper is recommended.

The 3812 is shipped with the following supplies installed: a Toner Cartridge, a Photo Conductor Unit, a Developer Unit, a Fuser Unit. 1 Primary Paper Cassette and one Alternate Paper Cassette are also shipped with the machine.

Supplies are not covered under the Agreement for Purchase of IBM Machines or the IBM Maintenance Agreement. IBM Service Representatives will not install supplies; installation of supplies is a customer responsibility.

Customers who frequently use different media or paper sizes should consider ordering additional cassettes. It is the customer's responsibility to ensure availability of supply items for necessary operation of the 3812 and to replenish/replace supplies as needed.

Until customers' usage is determined, customers should stock at least one extra unit of each supply item.

Supplies may be ordered by calling IBM Direct for additional information, including quantity discounts, consult your local IBM Branch Office.

Features	Model 1	
	P/N	Feature
Sharing Card	1348408	#3115
BISYNC Communications (Required for VM support 5798-DTE)	1348496	#3060
System/36 and System/38 Attachment Feature	1348409	#3015
Language Group 1 Diskette For PC only	1686395	#3075
Language Group 2 Diskette For PC only	1686396	#3080
Language Group 4 Diskette For PC only	6192333	#3110
Language Group 4 For System 36/38	6192362	#3120
Language Group 2 For System 36/38	1686399	#3100
Heated Cassette 100V/120	1686477	#3070
200V/240	1686478	#3070
RT PC System Attachment Model 1 to Model 2 Conversion	1686476	#3065
Tempest	04F5268 6192412	#3125

Features	Model 2	
	P/N	Feature
Sharing Card	1348408	#3115
BISYNC Communications (Required for VM support 5798-DTE)	1348496	#3060
System/36 and System/38 Attachment Feature	1348409	#3015
Language Group 1 Diskette For PC only	1696665	#3160
Language Group 2 Diskette For PC only	1696668	#3165
Language Group 4 Diskette For PC only	1696671	#3170
Language Group 4 For System 36/38	6192362	#3120
Language Group 2 For System 36/38	1686399	#3100
Heated Cassette 100V/120	1686477	#3070
200V/240	1686478	#3070
RT PC System Attachment	1696683	#3155
Tempest	6192412	#3125

#### Cables

P/N	Feature
Printer cable for IBM PC, PC/XT, PC Portable,	

3270 Personal Computer AT, 3270-PC, PC/AT		
6 meter	1348421	#3030
24 meter	1348423	#3040
PC/AT and 3270 PC AT to RS-232-C adapter connector (required on PC/AT and 3270 PC AT and should be ordered as a feature of the PC/AT and 3270 PC AT)		
254mm	6450242	#0242
Serial Adapter Cable 10 feet	6450217	#0217
RT PC Cables		
Serial Printer Cable (9-pin) for Serial/ Parallel Adapter Card	6298993	#8993
Serial Printer Cable (10-pin) for Native Serial Ports	6294803	#4803
Serial Printer Cable (10-pin) for 4-Port Asynchronous RS-232-C Card	6294803	#4803
Modem to printer cable for VM attach 6 meter	1348428	#3045
S/36 and S/38 printer cable options (See "Special Features")		
Power Cord (Chicago only) 6 feet	1348338	#9986
System/36, System/38 Attachment Feature	1348409	#3015
Accessory Printer Stand	1348481	#3050

#### Program Offerings:

IBM PC/DOS Pageprinter (3812) Driver	5777-UAD
Font Manager	5777-UAE
Pageprinter (3812)	
VM Support	5798-DTE

#### Program Products:

Feature Fonts (with 5758-DTE, IBM 3812 Pageprinter VM Support)	
Sonoran Serif	5771-ABA
Sonoran Sans Serif	5771-ABB
Pi and Specials	5771-ABC
APL2	5771-ADB
Datal	5771-ADA

The IBM Standard License Agreement applies to these Feature Font offerings.

#### Supplies:

P/N	Description	Average Print Yield
1348349	Toner Cartridge	10,000
1348347	Photoconductor Unit	20,000
1348330	Developer Unit	120,000
1348331	Fuser Unit	120,000
1348351	100 Volt Fuser	120,000
1348352	220 Volt Fuser	120,000
1348353	240 Volt Fuser	120,000
1348335	Cassette - Primary	
1348336	Cassette - Secondary	

## 3814 SWITCHING MANAGEMENT SYSTEM

### PURPOSE

Provides channel to control unit(s) switching under single point control in combinations up to 128 nodes or a single switch matrix as large as 8 x 16 or 16 x 8. Switching can be effected at up to four locations which may be as distant as 305m (1,000 ft) from each other and connected via customer-supplied loop cable which begins and ends at the model A controller. Power sequencing of switched control units and single location control of control unit two-channel switches can also be managed by the 3814.

### MODELS

Cntrllr	Remote Unit	Expansion Unit	-- contains
Model A1	B1	C1	one 4x4 switch
(A01)	(B01)	(C01)	
Model A2	B2	C2	one 4x8 switch
(A02)	(B02)	(C02)	
Model A3	B3	C3	one 8x4 switch
(A03)	(B03)	(C03)	
Model A4	B4	C4	two 4x4 switches
(A04)	(B04)	(C04)	

Model Bs require a model A as a prerequisite and can function as a logical expansion of a primary switching location or, if logically independent, can be up to 305m distant. Model Cs attach to either model As or Bs and provide up to 32 nodes which may be logically combined with their prerequisite model to provide larger switching matrices. An alternate model A controller can be attached to the loop with feature #1430. Switching control to the alternate controller may be performed under operator control. This switchover is automatic in the event of some controller malfunctions or control power loss. Operator control is via 3178 model C20 or 3278 model 2 and a maximum of two of these display stations can be used. Attachment of 3178 or 3278 terminals requires feature #1420 and its prerequisite feature #1410. 3604 model 6 may also be used as a local console or up to 305m from the 3814, but the 3604 is no longer available from IBM. One 3178 model C20 or 3278 model 2, with the Control Unit Switch Accessory Feature (P/N 1743301), can be shared between two 3814 subsystems. A maximum of three 3287 model 1s or 2s can be attached with feature #1420 providing hard copy of audit trails and configurations. These printers may be shared with other 3814 systems by using a coax selection switch. The addition of the System Attachment Feature #1440 provides a path to a 3274 or 3276 to allow a terminal attached to the host processor to be used for operator control. The Multi-System Configuration Manager licensed program or similar user-written software is required by feature #1440. Together, they allow control of up to 64 of the 3814 model 4 units and their associated model B and C units from a host-attached terminal.

Authorization to operate the 3814 is incorporated into the product and under control of passwords. With feature #1420 an additional authority level and 32 passwords are provided. A time stamped audit-trail of configuration changes is provided for display and/or printing. The use of installation defined names for configurations, logical channel/control unit interfaces, logical matrices and control unit identification is provided with feature #1420.

The 3814 can switch either data streaming or non-data streaming devices.

**Nomenclature:** The first number of the switch expression specifies the number of channels and the second number indicates the number of switchable interfaces (with one or more control units). Thus, a 4 x 8 designates a switch capable of connecting any of four channels to any combination of eight switchable interfaces. The intersections of the channel and switchable interfaces within the 3814 are called nodes and, taken together, comprise the switch matrix. Thus, a 4 x 8 switch has a switch matrix of 32 nodes.

**Limitations:** The 3814 is designed to function only in a raised floor machine room environment. The 1419 equipped with #7720 or #7730 (single or dual address adapter) requires external interrupt features on the associated CPUs to enable the 1419s to operate. These features are not supported by the 3814. 4.5M bps devices switchable through a 3814 require Reduced Diameter Channel cable between the 3814 and the channel. Channel and control unit cable length restrictions must be observed.

**Note:** Contact Special Equipment Engineering for 2835/2305 attachment information.

**Prerequisites:** Every 3814 system requires a model A controller and a console device. The console device may be a 3178 model C20 or a 3278 model 2. If the 3814 is attached to the host processor, feature #1440 is required, and the console function can be performed by a host-attached terminal. However, a terminal attached directly to the 3814 is required during setup and to run diagnostics. If feature #1430 and feature #1440 are installed on 3814 model A, the alternate 3814 model A must have the same features installed. The 3814 attaches to byte and block multiplexer channels of any S/370 model 135 and up, 3031, 3032, 3033, 3081, 3083, 3084, 3090, 4331, 4341, 4361, or 4381 Processor.

### HIGHLIGHTS

- Provides the capability to receive, interconnect and repower both the in-bound and out-bound lines of the standard S/360 and S/370 I/O interface.
- Includes an integrated microcode driven processor.
- A confirmation mechanism ensures switching has been done.
- Changes configuration quickly via prestored configuration definitions
- Provides storage for up to 80 configurations including current and prior configuration.
- Provides an additional 384 cross-point configurations with feature #1420.
- Standard operation permits channel switching only when channel interface is active.
- Switches channels having the Two-Byte Interface using twice the nodes of other channel to control unit switching.
- The operator can display current configuration status without affecting on-going operations.
- Permits up to four physical locations per 3814 for one logical or multiple logical switches.
- Provides single control point for control units with the two-channel switch and remote switch attachment features.
- Provides centralized control for up to 64 of the 3814 systems with feature #1440.
- Allows any host-attached terminal to act as a switching console with feature #1440.
- Provides storage for up to 7 two-channel switch combinations including current and prior configurations.
- Provides an additional 320 two-channel switch stored configurations with feature #1420.
- Allows 64 multiple configurations, each one specifying a list of up to 32 cross-point and/or two-channel switch configurations.
- Provides for power sequencing of attached control units.

## MACHINES

- Each 3814 model may be placed under power sequence control of up to four processors so that it will be powered on via the powering of the first processor and powered off via the last processor to power down.
- Permits switching of control units operating at 4.5M bps.

**RAS Characteristics:** The 3814 enters a diagnostic check-out procedure as part of the power-on sequence. Once in operation, operating elements are continuously monitored to detect malfunctioning hardware within the 3814. Upon detection of certain malfunctions, an audible alarm and a visual indicator alert operators to a potential problem. Error indicators are saved within the system for assisting in later diagnosis. Since on-going use of the switchable configuration may continue, the user may not have experienced impact and the net result of the detected failure may be an early alert to a pending problem.

The modularity of the 3814 power design and the ability to isolate power contribute greatly to its serviceability. Since the channel switching function remains static between changes and the CE may power-down and power-up individual frames and portions of the system, he may effect repair of failing elements of the 3814 while customer use of other elements continues. One may power-down, repair the failing element, and power-up the isolated portion of the system and return it to operational use. Major elements of the 3814s to which the above description applies are: The 3814 processor and its storage, the diskette drive, the channel interface switches, the 4 x 4 switch elements and some power supplies. The Alternate Controller Feature allows duplication of the control function in a 3814 system.

**Configuration Guidance:** Refer to Tables A, B or C for the model/feature combinations recommended for various I/O switching requirements. If requirements are for multiple remote switches, apply the formula outlined under the heading, "Multiple Remote Switches." These tables are not intended to reflect all possible configuration options. If the Alternate Controller Adapter Feature is installed, the appropriate model A will be substituted for a model B.

Single Switch Configurations (Table A)

Size	Model/Feature Required
4x4	A01
4x8	A02 or A01 + B01
4x12	A02 + C01 or A02 + B01
4x16	A02 + C02 or A02 + B02
8x4	A03 or A01 + #1531 + B01
8x8	A02 + #9721 + C02 + #1521 or A02 + #1531 + #1532 + B02
8x12	A03 + C03 + B03 or A03 + B03 + B03
8x16	A02 + #9721 + C02 + #1521 + B02 + #9721 + C02 + #1521
12x4	A03 + #9720 + C01 + #1520 or A03 + #1532 + B01
16x4	A03 + #9720 + C03 + #1520 or A03 + #1532 + B03
16x8	A02 + #9721 + C02 + #1521 + #1531 + B02 + #1532 + C02 + #1521

### Multiple Primary or

Multiple Remote Switches (Table B)

Switch Combos	Primary Loc. Model/Feat. Required	Remote Loc. Model/Feat. Required
2 (4x4)	A04	B04
3 (4x4)	A04 + C01	B04 + C01
4 (4x4)	A04 + C04	B04 + C04
(4x8) + (4x4)	A02 + C01	B02 + C01

(4x8) + 2 (4x4)	A02 + C04	B02 + C04
(4x8) + (4x8)	A02 + C02	B02 + C02
(8x4) + (4x4)	A03 + C01	B03 + C01
(8x4) + 2 (4x4)	A03 + C04	B03 + C04
(8x4) + (4x8)	A03 + C02	B03 + C02
(8x4) + (8x4)	A03 + C03	B03 + C03

**Note:** Either the model/feature at the primary or the remote locations can easily satisfy the requirements outlined under switch combinations. Also, any model B requires a prerequisite model A.

### Switch Combinations Including an 8x8

#### Or Greater (Table C)

Switch Combos	Model/Feat. Required
(8x8) + any combination from Table B	Table A Build-up + Remote Build-up from Table B
(8x12) + (4x4)	Table A + C01
(8x12) + 2 (4x4)	Table A + C04
(8x12) + (4x8)	Table A + C02
(8x12) + (8x4)	Table A + C03
(12x4) + (4x4)	Table A + C01 + C04
(12x4) + any combination from Table B	Table A + Remote Build-up from Table B
(12x8) + (4x4)	Table A + C01
(12x8) + 2 (4x4)	Table A + C04
(12x8) + (4x8)	Table A + C02
(12x8) + (8x4)	Table A + C03
(16x4) + any combination from Table B	Table A + Remote Build-up from Table B

**Multiple Remote Switches:** Where the requirement is for multiple remote switches, the following formula should be used. No more than three remote locations are permitted. Using the switch definition from Table A or B, calculate the number of nodes by location by multiplying the switch expression. Substitution in the tables of an appropriate model B Remote Unit may be required in lieu of the equivalent size A or C model.

$$(\text{NUMBER OF PRIMARY NODES}) + (\text{NUMBER OF REMOTE NODES, 1st LOCATION}) + (\text{NUMBER OF REMOTE NODES, 2nd LOCATION}) + (\text{NUMBER OF REMOTE NODES, 3rd LOCATION}) \leq 128 \text{ (cannot exceed 128)}$$

For additional configuration guidance, refer to the "IBM 3814 Switching Management System Product Description Manual", GA22-7075.

**Stored Configurations:** The number of stored configurations is determined by the following formula:

$$N = 10 \times \frac{\text{Ch} \times \text{CU}}{16}$$

Where N is the number of configurations stored per logical switch. The previous and current configurations always occupy configurations number 0 and 1, respectively.

For example, each 4x4 can have eight customer-defined configurations, plus previous and current. An 8 x 16 has 78 defined plus previous plus current.

"Ch" is the number of channel interfaces on the logical switch.

"CU" is the number of control unit interfaces on the logical switch.

## SPECIFY

- Power (AC, 1-phase):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Cable for 3604 model 6. See "Accessories".

- Color: (A or B models) #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray, #9066 for pearl white.

- Unit Emergency Power Off: UEPO switches are located on model A Controllers and model B Remote Units. Depression of UEPO instantly drops power in any models making up the Switching Management System which are interconnected for power sequencing as well as control units which are under its power sequencing control.

Specify #9720 on model A3, A4, B3 or B4 when ordering special feature #1520 on an attached model C1, C3 or C4. #9720 must be removed if model C1, C3 or C4 is detached. #9720 requires the appropriate C Model at installation.

Specify #9721 on model A2, A4, B2 or B4 when ordering special feature #1521 on an attached model C2 or C4. #9721 must be removed if model C2 or C4 is detached. #9721 requires the appropriate C Model at installation.

- 4.5M bps Support (#9001): This feature code is to designate that the 3814 is operating at 4.5M bps data transfer rate and no parts or instructions are shipped. For 3814s shipped before September 1, 1987 Reduced Diameter Channel cables, cable group 0815, must be installed between the 3814 and the channel for those channels operating at 4.5M bps.

- Machine Nomenclature: (models A and B)

Canadian French	#2935	Spanish	#2931
English US	#2924		

## SPECIAL FEATURES

**Expanded Storage (#1410):** (Model A) Required when #1420 or #1430 or both. Maximum: One per model A. Field Installation: Yes.

**Display/Printer Attachment (#1420):** (Model A) Provides attachment of up to two 3178 model C20s or two 3278 model 2s, three 3287 model 1s or 2s, additional stored cross-point and two-channel switch configurations, additional 32 security passwords across four authority levels and the capability to assign installation defined names for configurations, and time stamped audit-trail of configuration switching activity for display on the console. Prerequisites: #1410. Maximum: One per model A. Field Installation: Yes.

**Alternate Controller (#1430):** (Model A) Provides backup to the model A in a system through the attachment of a second model A. Both A models must have this feature installed. The Alternate Controller takes the place of one model B switching unit on a 3814 configuration. Prerequisites: #1410. Maximum: One per model A. Field Installation: Yes.

**System Attachment (#1440):** Model A permits attachment to a 3274 to provide a control path to a host processor. With appropriate programming support, the 3814 can be controlled by a host-attached terminal acting as a switching console. A 3178 or 3278 console attached through feature #1420 is optional when this feature is installed. Prerequisites: #1420. Maximum: One per model A. Field Installation: Yes.

**Channel Expansion Internal - Four Control Unit Interfaces (#1520):** (Models C) Required when combining a model C with a model A or B for the purpose of expanding the number of channel interfaces. This feature is required when combining a 4 x 4 (C1) or 8 x 4 (C3/C4) with an 8 x 4 (A3/A4/B3/B4) to create a 12 x 4 or 16 x 4 switch. Prerequisites: Models A3, A4, B3 or B4 with specify #9720. Limitations: A4 or B4 models must be cabled as an 8 x 4. Cannot be installed with #1521. Maximum: One per model C1, C3 or C4. Field Installation: Yes.

**Channel Expansion Internal - Eight Control Unit Interfaces (#1521):** (C models) Required when combining a model C with a model A or B for the purpose of expanding the number of channel interfaces. This feature is required when combining a 4 x 8 (C2/C4) with a 4 x 8 (A2/A4/B2/B4) to create an 8 x 8 switch. Prerequisites: Models A2, A4, B2 or B4 with specify #9721. Limitations: A4 or B4 models must be cabled as a 4 x 8. Cannot be installed with #1520. Maximum: One per model C2 or C4. Field Installation: Yes.

**Channel Expansion External (#1531, #1532):** #1531 for first 4 x 4, #1532 for second 4 x 4. This feature provides an external cable connection for the control unit input of a 4 x 4 matrix for the purpose of expanding the number of channel interfaces for an A, B, or C model. #1531 is required to allow connection through external cables to control unit inputs of the first 4 x 4 matrix in models A1, B1, C1, A2, B2, C2, A4, B4 or C4. #1532 is required to allow connection through external cables to control unit input of the second 4 x 4 matrix in models A2, B2, C2, A3, B3, C3, A4, B4 or C4. #1531 is required to create an 8 x 4 switch within an A4, B4 or C4. The #1531, #1532 may exist without the connection of external cables. Prerequisites: A, B or C models -- when expanding the channels on an 8-channel switch, #1531 and #1532 are required. Limitations: #1531 cannot be installed on A or B models with #9721. #1532 cannot be installed on A or B models with #9720 or #9721. #1531 cannot be installed on A3, B3 or C3 models. #1532 cannot be installed on A1, B1 or C1 models. Maximum: One #1531 for model A1, B1, C1, A2, B2, C2, A4, B4 or C4. One #1532 for A2, B2, C2, A3, B3, C3, A4, B4 or C4 models. Field Installation: Yes.

**Control Unit Power Sequencing (#1811, #1812, #1813, #1814):** Each feature provides power sequencing control for up to four control units attached to any model 3814. #1811 for first group of control units, #1812 for second group of control units, #1813 for third group of control units, #1814 for fourth group of control units. Limitations: Features must be installed in sequence. Maximum: One each per model A, B or C. Field Installation: Yes.

**Remote Two-Channel Switch Control - Basic (#6010):** Provides single point control for the remote enable/disable function on control units having two-channel switches with remote switch attachment features. #6010 provides for control of eight pairs of interface selections. Prerequisites: Two-channel Switch and Remote Switch Attachment and/or Two-channel Switch, Add'l and Remote Switch Attachment, Add'l required on affected control units. Maximum: One per model A, B or C. Field Installation: Yes.

**Remote Two-Channel Switch Control - Additional (#6011, #6012, #6013):** Provides expansion of the two-channel switch control capability for controlling eight additional pairs of interface selections. #6011 for first additional, #6012 for second additional, #6013 for third additional. Limitations: Features must be installed in sequence. Prerequisites: #6010 ... Two-channel Switch and Remote Switch Attachment and/or Two-channel Switch, Add'l and Remote Switch Attachment, Add'l required on affected control units. Maximum: Three groups of eight per model A, B or C. Field Installation: Yes.

**System Power Sequencing - Add'l (#6350):** Provides power sequencing control from the 5th through 8th system. Maximum: One per model A, B or C. Field Installation: Yes.

## MODEL CONVERSIONS

The following model changes are field installable -- model A1 to A4, model B1 to B4, model C1 to C4. All other model changes are available at time of manufacture only.

**MACHINES****ACCESSORIES**

Cables: Cables to interconnect 3178 C20 units and/or 3278 and/or 3287 units and 3814 units may be purchased from IBM or a customer selected source. See "IBM Input/Output Equipment Installation Manual - Physical Planning: System/360, System/370, 4300 Processors", GC22-7064, for cable and connector specifications.

Assembled cables may be purchased from IBM. Order via MES from plant of manufacture. Specify cable assembly number. Allow a lead time of 120 days.

Item	Number	Description	Max Length
Assm.	1563155	Loop Cable Assembly (indoor)	304.8m (1,000 ft)

**SUPPLIES (NONE)**

## 3820 PAGE PRINTER

### PURPOSE

The 3820 Page Printer is a high quality, laser printer which provides cut-sheet duplex printing for distributed printing applications in the following operating system environments:

- MVS - MVS/SP with JES2 or JES3 on both S/370 and XA processors
- VSE - VSE/SP or VSE/AF with VSE/POWER on S/370 mode processors
- VM - VM/SP or VM/SP HPO on S/370 mode processors.

The 3820 Page Printer operates at speeds up to 20 pages per minute for single-sided printing and can be attached via SDLC communications or may be directly attached to a System/370 channel in the MVS, VSE and VM environments. Both attachments are driven through VTAM/SNA. (Canada only) The 3820 Page Printer can also be attached to an IBM PC connected to an IBM PC Network or a Corvus OMNINET\* local area network.

\* OMNINET is a trademark of Corvus Systems, Inc. <)

### SPECIAL APPLICATIONS

**Remote PrintManager:** The Remote PrintManager is a PC AT based product which allows selected font data, overlays, and page segments that are present in Advanced Function Printing data streams to be locally available to a remote 3820 Page Printer. The PC AT communicates with an MVS host via TP lines and to a 3820 printer via a S/370 Channel Emulator card resident in the PC AT.

Remote PrintManager is designed to reduce communication line traffic for remotely attached 3820s, to provide performance improvements for "resource intensive" applications, and to provide cost savings in the communication area.

For additional information on the Remote PrintManager, see Programming Announcement dated March 17, 1987.

### MODELS

**Model 1 001:** Provides support for languages and paper sizes.

#### Prerequisites

- MVS - Print Services Facility/MVS (5665-275)
- VSE - Print Services Facility/VSE (5666-319)
- VM - Print Services Facility/VM (5664-198)
- PC-LAN - PrintManager (5875-XXX)

**Note:** Refer to the USM for the above products for specific release levels and other software prerequisite products.

### HIGHLIGHTS

- Advanced Function Printing capability
- All Points Addressable printing
- 240 X 240 pel
- Up to 20 pages per minute
- Remote printing via SDLC communications facilities
- S/370 channel attachment via VTAM
- PC-LAN attachment
- Duplex printing

### DESCRIPTION

The 3820 Page Printer functions as a remotely-attached printer via SDLC communication or channel attach through VTAM in an SNA environment under MVS/370 and MVS/XA with MVS/JES2 and MVS/JES3; under VSE/SP or VSE/AF with VSE/POWER; under VM with VM/SP or VM/SP HPO. (Canada only) The 3820 Page Printer can also be attached to an IBM PC Network or a Corvus OMNINET local area network via SDLC communication attachment to an IBM PC. <)

The 3820 Page Printer supports a wide variety of paper sizes and weights, which are country dependent. The paper path is set to the size of paper which the printer will be handling (Letter or A4) by the plant of manufacture and the IBM Service Representative. The 3820 Page Printer prints on the following size paper: Letter (8-1/2 x 11), Legal (8-1/2 x 14), A4 (210mm x 297mm), B4 (257mm x 365mm), B5 (182 x 257mm), and Executive (7 x 10.5, 7.25 x 10.5, and 7.5 x 10.5). Paper weights for simplex printing range from 20 to 24 pounds (75 to 90 G/m2) for legal size paper and from 16 to 24 pounds (60 to 90 G/m2) for other supported paper sizes. 42 pound (157.5 G/m2) A4 paper size is also supported. Additionally, self-adhesive label sheets and 2-, 3-, and 4-hole punched paper are supported as print media.

Documents are printed as single sets, and pages exit the printer face down in transmitted page sequence. Multiple sets require retransmission from the host. Duplex printing is provided in both normal mode and tumble mode. Each may be specified by page. Paper weights supported for duplex are 20 to 24 pound (75 to 90 G/m2). (Japan only) 17 pound (65 G/m2) paper is supported by duplex. <)

The 3820 Page Printer provides a single font (Prestige Elite) as standard and receives other fonts via downloading from the host. Up to 32 single byte fonts per sheet may be stored and printed, depending upon available Pattern Storage, with fonts available from IBM in sizes from 4 points to 36 points. (A point is a typesetting measure of character size and is approximately 1/72 of an inch.)

Normal typewriter fonts are also supported in 10 and 12 pitch. Fonts may be printed in any of four orientations: 0, 90, 180, and 270 degrees.

The 3820 Page Printer provides the capability of processing single and double byte fonts, selectable by the customer. This allows the use of double byte character sets, such as required for Kanji, in addition to the smaller character sets characteristic of US fonts.

The following font offerings are available for the 3820 Page Printer in MVS, VSE, or VM environments:

- All IBM 3800 Mdl 3 or Mdl 8 Compatibility Fonts, including selected IBM 6670 Fonts, provide compatible fonts for alphanumeric and selected graphic applications. The 3820 Page Printer prints the OCR-A and OCR-B fonts with the same high quality as other type styles. However, due to variations in print registration and reader requirements, IBM does not warrant that these characters are readable by OCR reading devices. Users of these fonts should thoroughly test read-write compatibility before implementing the 3820 Page Printer for OCR.
- IBM Typographic Fonts which are available for the IBM 3800 Mdl 3 or Mdl 8 and provide Sonoran Serif Fonts\* (5771-ABA), (Data derived under license from The Monotype Corporation, Limited), Sonoran Sans Serif Fonts (5771-ABB), Pi and Special Fonts (5771-ABC), APL2 Fonts (5771-ADB), and Datal Fonts (5771-ADA). This offering allows support for 11 languages and font sizes from 4 to 36 points.
- IBM Double Byte Character Fonts-Kanji Source Fonts for the 3820 Page Printer, (5771-ADE), Kanji Object Fonts for the 3820 Page Printer/MVS, (5771-ADF), and Kanji Object Fonts for the 3820 Page Printer/VSE, (5771-ADG).

(Canada only>The IBM LAN PrintManager program includes 54 (IBM supplied) 240 by 240 pel (A pel is defined as a picture element) per square inch fonts, including representations of the IBM 5152 Graphics Printer fonts.<)

**Data Stream:** The 3820 Page Printer supports the Intelligent Printer Data Stream (IPDS) only. Other data streams are supported through the Print Services Facility for the printer. See the "Programming Section of the Sales Manual Pages" for details.

The 3820 Page Printer is configurable by the customer. The Control Panel is used to specify changes or unique operating and printing requirements. The following may be specified at installation, or at any time the customer needs change:

- Country of operation.
- Display support for text message in French (Canadian), French (France), English (US), German, Spanish (Spain), or Italian. For non-supported languages, numeric messages may be displayed.
- Default paper sizes.
- Type of SDLC communication attachment.

In addition, the Control Panel is also used for initiating printer diagnostics, creating duplicate or back-up internal diskettes, and controlling the printer.

#### Printer

- All points addressable printing at 240 by 240 picture elements (pels) per square inch is supported.
- Prints at speeds up to 20 pages per minute for single-sided printing on letter and A4 size paper. Actual speed depends on the application, host programming support and communication facility. Refer to the "IBM 3820 Page Printer Introduction and Planning Guide", G544-3520, for additional details.
- Two side printing (duplexing) at speeds of up to 10 pages (20 sides) per minute is supported for letter or A4 size paper. Two modes of duplexing, normal and tumble, are available.
- Two paper supplies: A hopper holding 1,100 sheets of paper, and a cassette holding 250 sheets of paper.
- One output stacker holding 1,250 sheets, in transmitted page sequence.
- Automatically offsets printed jobs 1/2 in. for easy job separation.
- Up to 32 single byte fonts per sheet may be stored and printed, depending upon available Pattern Store, with fonts ranging in size from 4 points to 36 points.
- Supported as an SNA/SDLC remote printer via communications in S/370 environments under MVS/SP-JES2 and JES3 Version 1 Release 3.4 or higher; XA environments under MVS/SP-JES2 and JES3 Version 2 Release 1.2 or higher; in VSE environments under VSE/SP 1.1.0 or VSE/SP 2.1.0 with VSE/POWER; in VM environments under VM/SP Release 4 or higher, or VM/SP HPO Release 4.2 or higher.
- Supported as a direct S/370 Channel attach printer, through VTAM/SNA, in System/370 environments under MVS/SP-JES2 and JES3 Version 1 Release 3.4 or higher; XA environments under MVS/SP-JES2 and JES3 Version 2 Release 1.2 or higher; in VSE environments under VSE/SP 2.1.4 or VSE/AF 2.1.3 with VSE/POWER 2.2; in VM environments under VM/SP Release 4 or higher, or VM/SP HPO Release 4.2 or higher.
- (Canada only>Supported as an SDLC communications printer when attached to an IBM PC connected to an IBM PC Network under DOS 3.1 or a Corvus OMNINET under DOS 2.0 or DOS 3.0 with appropriate prerequisite support on Corvus OMNINET.<)

#### Control Panel

- Primary user interface for control of the printer, diagnostics, and printer configuration information.
- Display supports any of the following languages plus numeric codes for user interaction with the printer: French (Canadian), French (France), English (US), German, Spanish (Spain), Italian. Language is selected by configuration options and may be changed as required.
- 22 active keys on the keypad.
- 32-character vacuum fluorescent display for displaying messages.
- Audible alarm for user feedback when keying information and for alerting the user to various conditions needing attention. The alarm has a volume control which may be adjusted for the printer environment.

#### Attachments

- Communications:
  - SDLC Link.
  - SNA via ACF/VTAM, PU Type 2.0 and LU Type 6.2 supporting APPC (Application Program to Program Communication).
  - ACF/NCP
- S/370 Channel Attachment through VTAM
  - 3274 Mdl A "like" Attachment.
  - SNA protocol identical to a communications attachment with ACF/VTAM.
  - Channel commands carry both the printer data stream and SNA protocol.

#### Physical Specifications:

Width - 152cm (60 in)  
          including cassette and hopper  
Depth - 67cm (26.5 in)  
Height - 119cm (47 in)  
          including Control Panel  
Weight - 272Kg (600 lbs)

**Software Required MVS/VSE/VM:** Print Services Facility/MVS (5665-275), Print Services Facility/VSE (5666-319), or Print Services Facility/VM (5664-198), and their prerequisite Licensed Programs are required for the operation of the 3820 Page Printer. See the "Programming Section of the Sales Manual" for detailed information.

(Canada only>IBM Personal Computer Local Area Network. The IBM Local Area Network PrintManager is required. See the "Programming Section of the Sales Manual" for detailed information.<)

#### Hardware Required, MVS Communications

- Processors
  - S/370 mdls 158 and 168
  - 303X and 308X Processors
  - 4341 Processor
  - 4361 Processor Mdl Group 5
  - 4381 Processors
  - IBM Processors operating in S/370 Extended Architecture mode.
  - 9375 Model 60
  - 9377 Model 90
- Controllers
  - 3705 controller or equivalent
  - 3725 controller or equivalent
  - 3720 controller or equivalent

## MACHINES

- Integrated Communications Adapter (ICA) on the 4331 and 4361 Processors (ICA Attachment supports a data rate of no greater than 9600 bps)
- Direct attachment up to 100 ft. is supported on the Communication Controller or ICA configured with the appropriate features.
- EIA Interface Cable for modem attachment.
- Self-clocking external modem or modem eliminator which supports EIA RS-232-C interface and protocol. The following IBM modems are supported by the 3820 Page Printer.
  - Non-switched
 

3863-1	2400 bps	(Telegraph)
3864-1	4800 bps	
3865	9600 bps	
3868-1	2400 bps	
3868-2	4800 bps	
3868-3	9600 bps	
3868-4	9600 bps	
3872	1200/2400 bps	
5979-L41	2400/4800/9600/19200 bps	(Baseband)
  - Switched
 

3863-2	2400 bps	
3864-2	4800 bps	

### Hardware Required, VM Communications

- Processors
  - S/370 models 158 and 168
  - 303X, 308X and 3090 Processors
  - 4331 All models
  - 4341 All models
  - 4361 All models
  - 4381 All models
  - 9370 All models
- Controllers
  - 3705 controller or equivalent
  - 3725 controller or equivalent
  - 3720 controller or equivalent
  - Integrated Communications Adapter (ICA) on the 4331 and 4361 Processors (ICA Attachment supports a data rate of no greater than 9600 bps)
  - Direct attachment up to 100 ft. is supported on the Communication Controller or ICA configured with the appropriate features.
- EIA Interface Cable for modem attachment.
- Self-clocking external modem or modem eliminator which supports EIA RS-232-C interface and protocol. The following IBM modems are supported by the 3820 Page Printer.

Modem	Speed (bps)	Lines
3833 model 1	2400	Nonswitched voice grade
3834 model 1	4800	Nonswitched voice grade
3863 model 1/2	2400/1200	Nonsw or Sw voice grade
3864 model 1/2	4800/2400	Nonsw or Sw voice grade
3865 model 1/2	9600/4800	Nonswitched voice grade
3868 model 1	2400/1200	Nonswitched voice grade
3868 model 2	4800/2400	Nonswitched

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3868 model 3/4	9600/4800	voice grade Nonswitched
3872 model 1	2400/1200	voice grade Nonsw or Sw
5811 model 10	2400 to 19200	voice grade* Limited Distance Modem
5811 model 18		Rack mount version of model 10
5811 model 20	2400 to 19200	Nonswitched baseband
5811 model 28		Rack mount version of model 20
5812 model 10	2400 to 19200	Nonswitched baseband
5812 model 18		Rack mount version of model 10
5865 model 2/3	9600/7200 4800	Nonswitched voice grade
5868 model 52		Rack mount version of 5865 model 2
5866 model 2/3	14400/9600	Nonswitched voice grade
5868 model 62		Rack mount version of 5866 model 1/2
5979-L41	19200	Nonswitched baseband

### Hardware Required, VSE Communications

- Processors
  - S/370 mdls 158 and 168
  - 303X and 308X Processors
  - 4331 All mdls
  - 4341 All mdls
  - 4361 All mdls
  - 4381 mdls 1, 2, 11, 12, and 13 (System/370 mode only)
  - 4381 mdls 3 and 14 (Guest under VM)
  - 9370 All mdls
- Controllers or Integrated Communications Adapters
  - 3705 controller or equivalent
  - 3725 controller or equivalent
  - 3720 controller or equivalent
  - Integrated Communications Adapter (ICA) on the IBM 4331 and 4361 Processors (ICA Attachment supports a data rate of no greater than 9600 bps)
  - Direct attachment up to 100 ft. is supported on the Communication Controller or ICA configured with the appropriate features.
- EIA Interface Cable for modem attachment.
- Self-clocking external modem or modem eliminator which supports EIA RS-232-C interface and protocol. The following IBM modems are supported by the 3820 Page Printer.

Modem	Speed (bps)	Lines
3833 mdl 1	2400	Nonswitched voice grade
3834 mdl 1	4800	Nonswitched voice grade
3863 mdl 1/2	2400/1200	Nonsw or Sw voice grade
3864 mdl 1/2	4800/2400	Nonsw or Sw voice grade
3865 mdl 1/2	9600/4800	Nonswitched

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## MACHINES

3868 mdl 1	2400/1200	voice grade Nonswitched
3868 mdl 2	4800/2400	voice grade Nonswitched
3868 mdl 3/4	9600/4800	voice grade Nonswitched
3872 mdl 1	2400/1200	voice grade Nonsw or Sw
5811 mdl 10	2400 to 19200	voice grade* Limited Distance Modem
5811 mdl 18		Rack mount version of mdl 10
5811 mdl 20	2400 to 19200	Nonswitched baseband
5811 mdl 28		Rack mount version of mdl 20
5812 mdl 10	2400 to 19200	Nonswitched baseband
5812 mdl 18		Rack mount version of mdl 10
5865 mdl 2/3	9600/7200 4800	Nonswitched voice grade
5868 mdl 52		Rack mount version of 5865 mdl 2
5866 mdl 2/3	14400/9600	Nonswitched voice grade
5868 mdl 62		Rack mount version of 5866 mdl 1/2
5979-L41	19200	Nonswitched baseband

**MVS System/370 Channel Attachment Through VTAM:** The following IBM Processors are supported by System/370 Channel attachment through VTAM:

- 308X and 3090 Processors
- 4341 Processor
- 4361 Processor Model Group 5
- 4381 Processors
- IBM Processors operating in System/370 Extended Architecture mode
- 9375 Model 60
- 9377 Model 90

**VSE System/370 Channel Attachment Through VTAM:** The following IBM Processors are supported by System/370 Channel attachment through VTAM:

- 308X Processors (Guest under VM)
- 4331 All models
- 4341 All models
- 4361 All models
- 4381 Models 1, 2, 11, 12, and 13 (System/370 mode only)
- 4381 Models 3 and 14 (Guest under VM)
- 9373 Model 20
- 9375 Model 40
- 9375 Model 60
- 9377 Model 90

**VM System/370 Channel Attachment Through VTAM:** The following IBM Processors are supported by System/370 Channel attachment through VTAM:

- 308X and 3090 Processors
- 4331 All models
- 4341 All models
- 4361 All models
- 4381 All models
- 9373 Model 20
- 9375 Model 40

- 9375 Model 60
- 9377 Model 90

(Canada only) IBM Personal Computer Local Area Network IBM Personal Computers Supported:

- IBM PC Network: IBM Personal Computer, IBM Personal Computer XT, and IBM Personal Computer AT.
- Corvus OMNINET: IBM Personal Computer and IBM Personal Computer XT.

See the "Programming Section of the Sales Manual" for additional details.

**3044 Fiber Optics Attachment:** The following IBM Processors are supported by 3044 Fiber Optics attachment (Block multiplexer channel):

- 4361
- 4381
- 308X
- 3090.

### Additional Hardware

- SDLC communications adapter card and communications cable for attaching PC.
- EIA Interface Cable for modem attachment.
- Self-clocking external modem or modem eliminator, which supports EIA RS-232-C interface and protocol supporting point-to-point, non-switched, common carrier service. (<)

**Customer's Responsibilities:** It is the customer's responsibility to allocate the appropriate space and electrical requirements to properly accommodate the 3820 Page Printer. See "IBM 3820 Page Printer Introduction and Planning Guide", G544-3520, for additional details.

It is the customer's responsibility to insure the availability of the necessary supply items for the operation of the 3820 Page Printer, and to replenish/replace supplies as needed, with the exception of the developer mix. Customer supplied developer mix must be installed/replaced by a service representative when replacement is needed.

It is the customer's responsibility to provide the appropriate attachment facilities including modems, communication facilities, attachment cables.

**Publications:** The following publications are available from Mechanicsburg:

- "IBM 3820 Page Printer Introduction and Planning Guide", G544-3520
- "IBM 3820 Page Printer Reference Manual", S544-3175
- "Advanced Function Printing Software: General Information", G544-3415
- "IBM's Guide for Type Users", G544-3122
- "IBM-Supplied Fonts for System-Attached Printers", G544-3328
- "IBM's Guide for Using MVS Print Management Facility with Type Printing", G544-3123
- (Canada only) "IBM LAN PrintManager", G544-3184 (<)

The "3820 Page Printer Operator's Guide", S544-3080, and the "3820 Page Printer Operator Summary", S544-3081, are shipped with the printer. Additional copies are available from Mechanicsburg.

### SPECIFY

This section lists items which will be furnished when specified on an initial machines order. Unless otherwise noted, these specify

## MACHINES

features are only available at the time of manufacture. The number to the right of the item is the Feature Code.

- Color: Pebble Grey. No Specify.
- Voltage Group: The Voltage Group requirement is determined by the three-digit country code (120V or 200-240V). (Except Japan > No Specify required. <) (Japan only > Specify #2995 for 100V. No Specify required for 200-240V. <)
- Frequency Group: The three-digit country code determines the Voltage Group.

50Hz	10Amps	(200-240V)	#9005
60Hz	20Amps	(120V)	#9010
60Hz	10Amps	(200-240V)	#9010

**Memory:** Control Storage-768KB. No Specify.

**Country Group:** The Country Group requirement is determined by the three-digit country code. The Country Group contains the safety labels for the 3820 Page Printer. No Specify.

**Language Groups:** The Language Group specifies the language for the Control Panel Overlay, all labels other than safety labels, and the Operator's Guide.

English	#9050
French	#9025
German	#9030
Italian	#9035
Japanese	#9055
Spanish	#9040

**Font Selection:** One "Resident" font (Prestige Elite) is in the printer. No Specify.

**Power Cables:** Power cables requirements, (with the exception of Chicago and Japan), are determined by the three-digit country code and are "No Specify" items. (Japan only > Japan 100V cable determined by Specify in Voltage Group. <)

(Canada only >

10 ft. Twistlock, 20A cable-Standard

(6 ft. Twistlock, 20A cable provided for 3820s ordered (for Chicago only)) #9986

Connector Plug: NEMA L5-20P-Standard <)

Except in Canada and the countries listed below, a line cord of 3m will be attached to the machine. The appropriate plug will be attached by the customer engineer at the time of installation.

Australia

4m cable  
Plug configuration conforms to Australian standard AS C112-1964

New Zealand

4m cable  
Plug configuration conforms to New Zealand standard NZ 198

Japan

3.8m cable  
Plug configuration conforms to Japanese standard JIS C8303

## SPECIAL FEATURES

### Attachments

EIA Interface	#3050
S/370 Channel Interface	#3055

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Either the EIA or the S/370 Channel Interface Attachment must be specified.

**Feature Conversions:** To convert from an EIA attachment feature to a Channel attachment feature order RPQ FG0013. To convert from a Channel attachment feature to an EIA attachment feature order RPQ FG0014.

### Memory Sizes

Pattern Storage: (Must Specify a Minimum of One)

1024KB (1 1024KB Card)	#3020 (See note)
2048KB (2 1024KB Cards)	#3025
3072KB (3 1024KB Cards)	#3030
4096KB (4 1-24KB Cards)	#3065

**Note:** Field changes to Pattern Storage may be made by ordering increments of 512KB or 1024KB only, up to a maximum Pattern Storage of 4096KB. Marketing Representatives need to be aware that there are four available card slots for Pattern Storage memory cards. Therefore, storage requirements should be anticipated with the original order to preclude the possibility of scrapping purchased memory cards.

Machines using double byte fonts (Kanji, etc) must have minimum of 1024KB Pattern Storage.

### Miscellaneous

**Relocation/Discontinuance Kit:** In the event the 3820 is relocated or discontinued, MES B/M 7380762 should be ordered. The order will be filled by Charlotte, NC. The machine should be shipped via truck.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The following items are available from IBM on a purchase-only basis.

**EIA Interface:** An EIA Interface Cable specified below, or equivalent, is required if an EIA Interface Attachment Feature (#3050) is installed. For shipment with the machine, order the feature number below.

EIA Interface Cable-Long (12m)	#3040
EIA Interface Cable-Short (6m)	#3045

For shipment by MES, order the P/N below.

EIA Interface Cable-Long (12m)	1670923
EIA Interface Cable-Short (6m)	1670924

**S/370 Channel:** A System/370 Channel interface Cable specified below, or equivalent, is required if a System/370 Channel Interface Attachment Feature (#3055) is installed.

Channel Interface Cable Group	#3920
Power Sequence and Control CableUGroup	#1178

## SUPPLIES

Choosing the right supplies is very important for customer satisfaction with the 3820 Page Printer. For the best print quality and the most reliable performance, the use of IBM supplies is recommended. Supplies are purchase only items.

The 3820 Page Printer is shipped with a minimum quantity of supplies (2 200 gram bottles of IBM 3820 Toner, 1 bottle of IBM 3820 Developer Mix, and 1 bottle of IBM 3820 Fuser Oil). One IBM 3820 Paper Cassette, an accessory, is also shipped with the printer. The customer is responsible for ordering and keeping on hand adequate supplies to maintain operation of the 3820 Page Printer.

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## MACHINES

Consult your country supplies organization.

Description	P/N
IBM 3820 Toner 6 200 gram (7.1 ounce) Bottles per Carton	1669113
IBM Developer Mix 1 550 gram (19.4 ounce) Bottle per Carton	1669151
IBM 3820 Fuser Oil 1 900 cc (1.9 pint) Bottle per Carton	1669115
*IBM 3820 Paper Cassette	1678261
*IBM 3820 B5 Paper Cassette	1348140
IBM Multi-System Paper-Letter 8 reams of 500 sheets per ream (Available in U.S. Only)	7034548
IBM Multi-System Paper-Legal 8 reams of 500 sheets per ream (Available in U.S. only)	7034550

\* These items are considered accessories by IBM, but are ordered as described above.

**Note:** It is the responsibility of the customer to purchase supply items required for the operation of the 3820 Page Printer. The customer also is responsible for installation/replacement of supplies in the printer, with the exception of the developer mix. A service representative will install customer supplied developer mix when replacement is necessary. Replacement of the developer mix, a supply item, by a service representative, is available only for the 3820 Page Printer. This exception to the generally accepted practice of customer installation of supplies is made because the replacement of the developer mix requires use of tools and a technical knowledge of the developer mix, by an IBM Service Representative, is included in the 3820 Page Printer Warranty and Maintenance Agreement. For machines not under Maintenance Agreement, replacement of the developer mix is on a per call basis.

See "IBM 3820 Page Printer Introduction and Planning Guide", G544-3520, for details on estimated yields.

## SUPPORTING LICENSED PROGRAMS

### Typographic Fonts

- Sonoran Serif - (5771-ABA) is a typefont which is the functional equivalent of Monotype Times New Roman\*\*. This program product provides 14 sizes, 2 weights, and 2 styles (Roman and Italic) of this type face.
- Sonoran Sans Serif - (5771-ABB) is a typefont which provides the functional equivalent of Monotype Ariel\*\*. This program

product provides 14 sizes, 2 weights and 2 styles (Roman and Italic) of this type face.

- Pi and Specials - (5771-ABC) contains special purpose symbols, Sonoran Petite (a 4-point font which is the functional equivalent of Monotype Elfin\*\*) and Sonoran Display (a functional equivalent of Monotype Old English\*\*).
- Data - (5771-ADA) contains four 13.3-pitch fonts. These fonts are uniformly spaced and are provided in Roman, Italic, Roman Bold, and Extended Character Set variations. They contain the full complement of characters required by most text and data processing print applications.
- APL2 - (5771-ADB) contains thirteen fonts to support the extended APL2 character set. These fonts are uniformly spaced and consist of 10-, 12-, 13.3-, 15-, and 20-pitch variations.

\*\* Trademarks of The Monotype Corporation, Limited.

### IBM Double Byte Character Fonts

- Kanji Source Fonts for the 3820 Page Printer, (5771-ADE).
- Kanji Object Fonts for the 3820 Page Printer/MVS, (5771-ADF).
- Kanji Object Fonts for the 3820 Page Printer/VSE, (5771-ADG).

**Licensed Programs:** The 3820 Page Printer is supported by the Advanced Function Software Licensed Programs shown below:

- Print Services Facility/MVS, Release 1.1, (5665-275).
- Print Services Facility/VM, Release 1.0, (5664-198).
- Print Services Facility/VSE, Release 1.2, (5666-319).
- Print Management Facility/MVS, Release 1.1, (5665-307).
- Print Management Facility/VM, Release 1.0, (5664-310).
- Overlay Generation Language/MVS, Release 1.0 plus PTF, (5665-308).
- Overlay Generation Language/VM, Release 1.0, (5664-293).
- Overlay Generation Language/VSE, Release 1.0, (5666-324).
- Print Services Access Facility/MVS, Release 1.1, (5665-340).
- Print Services Access Facility/VM, Release 1.0, (5664-312).
- Page Printer Formatting Aid/VM, Release 1.0, (5664-199).
- Page Printer Formatting Aid/VSE, Release 1.0, (5666-327).
- Page Printer Formatting Aid/MVS, Release 1.0, (5665-351).
- Document Composition Facility, Release 3.0 plus PTF, (5748-XX9).
- Graphical Data Display Manager/VM, Version 2.1, (5664-200).
- Graphical Data Display Manager/MVS, Version 2.1, (5665-356).
- Graphical Data Display Manager/VSE, Version 2.1, (5666-328).
- Font Library Service Facility, Release 1.0, (5668-890).
- (Canada only) 3820 Page Printer Local Area Network PrintManager, (5875-XXX Feature Code #9396). <

## 3830 STORAGE CONTROL MDL 1, 2

### PURPOSE

Control unit for 3330, 3333, 3340, 3344 or 3350 disk storage.

### MODELS

**Model 1 001** [NO LONGER AVAILABLE] Provides for attachment of up to four 3330 modules in any combination of models 1 and/or 2. Attaches to S/360 model 195 or S/370 models 165, 168 or 195 via a 2880 Block Multiplexer Channel. Attachment to the S/370 models 135 or 145 is made via the system block multiplexer channel or selector channel and to the 135-3, 138, 145-3 and 148 via the block multiplexer channel. Attachment to S/370 models 155 or 158 is made via the system's block multiplexer channel. Attachment to a 3031, 3032 or 3033 Processor is made via a block multiplexer channel. Attaches to the 4341 or 4381 Processor via a block multiplexer channel.

**Model 2 001** [NO LONGER AVAILABLE] Provides for attachment 3333s (models 1 and/or 11) and/or 3340 model A2s and/or 3350 model A2s/A2Fs ... see DASD Configuration under "Specify". Additional storage is provided by attaching 3330 modules to the 3333 or by attaching 3340 model Bs and/or 3344s to the 3340 model A2 or by attaching 3350 model Bs and/or a model C to the 3350 model A2/A2F ... see DASD Configuration under "Specify" and M3330, 3333, 3340, 3344, 3350 pages.

Attaches to S/360 model 195 or S/370 models 165, 168 or 195 via a 2880 Block Multiplexer Channel. Attachment to S/370 model 135 (see "Limitations") or 145 is made via the system's block multiplexer channel or selector channel and to the 135-3, 138, 145-3 and 148 via the block multiplexer channel. Attachment to S/370 model 155 or 158 is made via the system's block multiplexer channel. Attachment to a 3031, 3032, 3033, 3081, 3083 or 3084 Processor is made via a block multiplexer channel. Attaches to the 4341 or 4381 Processor via a block multiplexer channel and to the 4331 (Model Group 2) or 4361 Processor via the High-Speed Block Multiplexer Channel. Note: The 3830 model 2 does not attach to a 3090 Processor.

**Prerequisites:** [1] The 3830 mdl 1 is designed for interconnected operation with 3330 Disk Storages. Customers who wish to order a 3830 mdl 1 for stand-alone or individual use should submit an RPQ to provide the necessary safety elements (covers, cable connectors, etc.) to complete the unit for a non-standard (i.e., not interconnected as part of a 3330 facility) environment. In lieu of the RPQ, the customer may provide safety elements equivalent to the standard 3830 mdl 1/3330 configuration or that provided by the RPQ. If not provided, the unit will be offered on a purchase-only basis. See "Specify". Agreement for IBM to install and maintain the 3830 mdl 1 in any non-standard environment must be reviewed with CE Regional Management prior to making a commitment to the customer.

[2] An available control unit position on a channel. One unshared subchannel for each drive attached on a system block multiplexer channel or a 2880 Block Multiplexer Channel. For S/360 (3330 series only) mdl 195 and S/370 mdl 165, 168, 195, see M2880 pages. For S/370, mdls 135 and 145, and 4300 processors, a system block multiplexer channel is required for support of block multiplexing and rotational position sensing ... see M3333, 3330, 3340, 3344 and 3350 pages. If this support is not required, attachment to a system selector channel is permitted.

**Limitations:** [1] Only one Two-Channel Switch (#8170) and one Two-Channel Switch, Add'l (#8171) can be installed on a 3830.

### HIGHLIGHTS

Data rate is 806,000 bytes per second for the 3333 and 3330, and 885,000 bytes per second for the 3340 and 3344 and 1,198,000 bytes per second for the 3350. File organization and format are under program control ... command structure permits flexible and efficient processing of either randomly or sequentially organized files. Data

integrity is provided through extensive error detection and correction capabilities.

**Standard Features:** ... include the following:

**Rotational Position Sensing** (optional on a 3340): Makes possible a "seek" to an explicit position on a track. The 3830 and the channel are released during most of record search time, thereby increasing channel and storage facility availability.

**Multiple Requesting** (on 3340, concurrent with optional Rotational Position Sensing): The 3830 mdl 1 allows up to eight, and the 3830 mdl 2 allows up to 32 channel command sequences to be active in the facility. Permits better utilization of control unit, devices, channel, and CPU.

**Command Chaining:** Allows sequential records within a cylinder to be read/written by a sequence of channel commands without rotational delays between records.

**Record Overflow:** Storage efficiency is obtained by allowing records to span track boundaries within a cylinder.

**Bibliography:** GC20-0001

### SPECIFY

- Power (AC, 3-phase, 4-wire): [must be consistent with 3330 or 3333 voltage]

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.
- Non-standard Environment: #9485 must be specified if the 3830 mdl 1 is not to be installed as part of a 3330 facility. Also see "Prerequisites" above.
- Language Groups: English #2927  
French #2928  
German #2929
- DASD Configuration (3830 mdl 2): The available combinations of storage devices which can be attached are shown in the tables below. One, two or three Xs in a vertical column indicate the type of machine(s) listed under DASD Configuration which can be attached when the "Required DASD Specify Features" are installed. Based on the DASD, and the Special Features listed below being ordered for them, order the Required DASD Specify Feature(s) from the appropriate table.

**3830 Storage Control Mdl 1, 2 (cont'd)**
**3830 MDL 2 WITH OR WITHOUT TWO-CHANNEL SWITCH (#8170)**

DASD Configuration		Required DASD Specify Features (2)						
		(1) 9313	(1) 9314	(1,3) 9315	(1,3) 9316	(1,4) 9317	(1,5) 9318	(1,5) 9319
3333 Only	One or two 3333s with associated 3330s	x	x					
	Up to four 3333s with associated 3330s			x	x			
	String Switch (#8150) on any 3333	x		x				
3340 Only	One or two 3340 mdl A2s with associated mdl B1/B2s		x	x				
	Up to four 3340 mdl A2s with associated mdl B1/B2s				x	x		
	String Switch (#8150) on any 3340 mdl A2		x		x	x		
	Fixed Head feature (#4301/#4302) on any 3340			x	x	x		
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s					x	x	
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340						x	
	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives			x	x			
3333 3340 -not 3344	String Switch (#8150) on any 3333 or 3340 mdl A2			x		x		
	Fixed Head feature (#4301/#4302) on any 3340				x	x		
3350 Only	Up to four 3350 mdl A2/A2Fs with associated mdl B2/B2Fs, C2/C2F						x	x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F						x	
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives							x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/or Fixed Head feature (#4301/#4302) on any 3340							x

**Notes:**

- ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.
- Any change to an installed DASD configuration requires an MES ONLY if the new configuration indicates that a different Specify and/or Special Feature(s) is required. The MES must include addition of any new Specify and/or Special Features not previously installed AND removal of any not listed as required for the new configuration.
- Control Store Extension (#2150) is prerequisite. With #9315, the 3830 mdl 2 requires 32 contiguous device addresses regardless of the number of drives attached.
- Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830 mdl 2 uses 64 contiguous device addresses irrespective of the number of drives attached. The 3340 mdl A2s on the first and third strings may attach up to three 3340 mdl B1s, B2s, and/or 3344s in any combination. The 3340 mdl A2 on the second string may attach up to three 3340 mdl B1/B2s. The 3340 mdl A2 on the fourth string may attach one 3340 mdl B1 or B2.
- Expanded Control Store (#2151), Control Store Extension (#2150) and Register Expansion (#6111) are prerequisites. For configurations in this group the 3830 mdl 2 uses 8 or 16 or 32 or 64 device addresses depending upon the DASD configuration installed and whether any 3350 drive is in 3330-1 compatibility mode.

**3830 MDL 2 WITH TWO-CHANNEL SWITCH, ADD'L (#8171) AND ITS PREREQUISITE TWO-CHANNEL SWITCH (#8170)**

DASD Configuration		Required DASD Specify Features (2)				
		(1) 9313	(1,3) 9315	(1,3) 9316	(1,4) 9317	(1,5) 9318
3333 Only	One or two 3333s with associated 3330s	x	x			
	Up to four 3333s with associated 3330s		x	x		
3340 Only	String Switch (#8150) on any 3333	x	x			
	One or two 3340 mdl A2s with associated mdl B1/B2s			x	x	
3340 3344	Up to four 3340 mdl A2s with associated mdl B1/B2s			x	x	
	String Switch (#8150) on any 3340 mdl A2			x	x	
3340 3344	Up to four 3340 mdl A2s of which up to two may attach 3344s					x
	String Switch (#8150) on any 3340 mdl A2 and/or Fixed Head feature (#4301/#4302) on any 3340					x
3333 3340 -not 3344	3333s and 3340 mdl A2s (any combination of 2, 3, or 4) each with associated drives				x	x
	String Switch (#8150) on any 3333 or 3340 mdl A2				x	
3350 Only	Up to four 3350 mdl A2/A2Fs with associated mdl B2/B2Fs, C2/C2F					x
	String Switch (#8150) on any 3350 mdl A2/A2F, C2/C2F					x
3333 3340 3350 -not 3344	3333s, 3340 mdl A2s and 3350 mdl A2/A2Fs (any combination of 2, 3, or 4) with associated drives					x
	String Switch (#8150) on any 3333, 3340 mdl A2, or 3350 mdl A2/A2F, C2/C2F and/or Fixed Head feature (#4301/#4302) on any 3340					x

**Notes:** For explanations, see Notes following the Table "3830 Mdl 2 With or Without Two-Channel Switch (#8170)".

**SPECIAL FEATURES**

**Control Store Extension (#2150):** [Mdl 2] Provides additional control store for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Prerequisites:** A Specify Feature must also be ordered ... see "Notes" under DASD Configuration Charts above to determine which is required. **Field Installation:** Yes. **Maximum:** One.

**Expanded Control Store (#2151):** [Mdl 2] Provides additional control store for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Prerequisites:** #2150. A Specify Feature must also be ordered ... see "Notes" under DASD Configuration Charts to determine which is required. **Note:** Customer price quotations and customer order acknowledgement letters must state: "Installation of this feature involves removal of parts which become the property of IBM." **Maximum:** One. **Field Installation:** Yes.

**Register Expansion (#6111):** [Mdl 2] Provides additional registers for microprogram use ... see DASD Configuration under "Specify" to determine when required. **Prerequisites:** A Specify Feature must also be ordered ... see "Notes" under DASD Configuration Charts to determine which is required. **Field Installation:** Yes. **Maximum:** One.

**Remote Switch Attachment (#6148):** [Mdl 2] To attach the Two-Channel Switch (#8170) to a configuration control panel. **Field Installation:** Yes.

**Remote Switch Attachment, Add'l (#6149):** [Mdl 2] To attach the Two-Channel Switch, Add'l (#8171) to a configuration control panel. **Field Installation:** Yes.

**Two-Channel Switch (#8170):** To attach the 3830 to a second channel ... the two channels may be on the same processor or different processors. An available control unit position is required on each channel ... see item [2] under "Prerequisites". Switching is under program control. The 3830 can be dedicated to a single channel by means of an Enable/Disable switch. **Specify:** #9721 only if #8170 is being ordered for field installation and will be installed at the same time as Two-Channel Switch, Add'l (#8171). **Field Installation:** Yes. **Maximum:** One.

**3830 Storage Control Mdl 1, 2 (cont'd)**

**Two-Channel Switch, Add'l (#8171):** Adds switching for two additional channels to a 3830 with Two-Channel Switch (#8170), providing four channel switch capability. **Limitations:** Only two channels of the four available can be attached to the same processor. Cannot be installed if Fixed Head feature (#4301/#4302) is installed on any 3340. **Specify:** #9722 only if #8171 is being ordered for field installation and will be installed at the same time as Two-Channel Switch (#8170). **Field Installation:** Yes. **Maximum:** One. **Prerequisites:** #8170, #2151 and/or #2150 are also required in certain 3830 mdl 2 configurations ... see DASD Configuration under "Specify".

**MODEL CONVERSIONS**

Model 1 to model 2 is field installable. Model 2 to model 1 is not recommended for field installation.

**ACCESSORIES** (None)

**SUPPLIES** (None)

## MACHINES

**3830 STORAGE CONTROL MDL 3**
**PURPOSE**

Provides for the attachment of 3333/3330/3350 DASD in a 3850 Mass Storage System.

**MODELS**

**Model 3 003**

**Prerequisites:** The 3830 mdl 3 must have the Two-Channel Switch (#8170) and Control Store Extension (#2150). One channel interface attaches to the 3851 MSF and one channel interface attaches to the host processor.

**Limitations**

- [1] A maximum of four 3830 mdl 3s may be attached to a S/370, 4341 or 4381 Processor block multiplexer channel. If 3830 mdl 1s or 2s and/or Integrated Storage Controls (#4650) are attached to the same block multiplexer channel, the maximum number of 3830 mdl 3s will be reduced. Consult *IBM 3850 Mass Storage (MSS) Installation Planning, and Table Create*, GC35-0028, for total system limitations.
- [2] String Switch (#8150) may be installed on the 3333/3350 in a 3850 MSS for additional availability. Installation is not recommended in a mixed MSS/Non-MSS environment. See M3333, 3350 pages for additional limitations.
- [3] 3340 DASD cannot be installed on the 3830 mdl 3.

**HIGHLIGHTS**

**Virtual Disk Storage:** Provides up to 64 unique addresses for each channel interface.

**Channel Interfaces:** Up to three processor channel interfaces are available, providing up to 192 unique addresses on each 3830 mdl 3.

**Drives:** Up to 32 DASD spindles of 3333/3330 mdls 1, 2 and 11 and 3350 mdls A2/A2F, B2/B2F and C2/C2F can be attached. A 3830 mdl 3 with #9320 can operate any combination of up to four 3333 mdls 1 and 11 with associated 3330 mdls 1, 2 and 11 and/or native 3350 mdls A2/A2F with associated native 3350 mdls B2/B2F and C2/C2F. A 3830 mdl 3 with #6250 can operate up to four 3350 mdls A2/A2F with associated 3350 mdls B2/B2F and C2/C2F in either native or 3330 mdl 11 mode. See M3333, 3330 and 3350 pages for additional information.

**Staging Drives:** Up to sixteen 3333 mdl 1/3330 mdl 1 or 2 storage devices can be designated as staging drives. 3333/3330 mdl 11 or 3350 in 3330 mdl 11 mode may also be used for staging drives; however, each mdl 11 or 3350 in mdl 11 mode drive designated as a staging drive is equivalent to two mdl 1 or mdl 2 drives. These staging drives will be used by the 3850 Mass Storage System to provide virtual storage. See note on M3333 pages for feature changes required when 3333s are retained for use with a 3851.

**Staging Paths:** The 3830 mdl 3 contains control store for data buffering and microcode. This accomplishes data staging without using S/370, 4341 or 4381 Processor channels or memory.

**Real Drives:** Up to a maximum of 32 attached drives may be designated as "real". Each Real drive uses one of the 192 unique 3830 addresses. All 3350 drives attached to a 3830 mdl 3 with #9320 must be designated as Real in 3350 native mode only. 3350 drives attached to a 3830 mdl 3 with #6250 may be designated as Real in 3350 native or 3330 mdl 11 mode.

**Virtual Storage:** All data stored in the 3850 Mass Storage System appears to the system as residing on a 3333/3330 storage device with all the data handling capabilities of the 3330 available.

**Limitations:** 3333/3330 Mdls 1, 2, 11 are not supported as staging drives on a 3090 Processor.

**Bibliography:** GC20-0001

**SPECIFY**

- Power (AC, 3-phase, 4-wire): [specify the same code for 3851 ... must be consistent with 3330 or 3333 voltage]

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	

- Color: #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, #9046 for white.

- DASD Designation: #9313 ‡ for 3333/3330 DASD, or #9320 ‡ for 3333/3330/3350 DASD.
- Language Groups:
 

English #2927	Italian #2932
French #2928	Japanese #2930
German #2929	Spanish #2931

**SPECIAL FEATURES**

**Control Store Extension (#2150):** [req'd] Provides additional control store for microprogram use. **Field Installation:** Yes.

**Expanded Control Store (#2151):** Provides additional control store for microprogram use. Required if 3350 DASD is attached. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150.

**Control Store, Add'l (#2152):** Provides additional control store for microprogram use. Required if 3350 DASD is attached. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2150, #6111 and #2151.

**Register Expansion (#6111):** Provides additional registers for microprogram use. Required if 3350 DASD is attached. **Field Installation:** Yes. **Maximum:** One.

**Remote Switch Attachment (#6148):** To attach the Two-Channel Switch (#8170) to a configuration panel. **Maximum:** One. **Field Installation:** Yes.

**Remote Switch Attachment, Add'l (#6149):** To attach the Two-Channel Switch, Add'l (#8171) to a configuration panel. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #6148.

**3350 Staging (#6250):** Provides for staging to 3350 drives in 3330 mdl 11 mode and access to Real 3350 in either native or 3330 mdl 11 mode. **Limitations:** Attachment of 3333 mdls 1/11, 3330 mdls 1, 2 or 11 is mutually exclusive with #6250. **Maximum:** One. **Field Installation:** Yes. **Prerequisites:** #2152 and #6111.

**Two-Channel Switch (#8170):** [req'd] Provides system channel attachment capability for the 3830 mdl 3. One channel interface attaches to the 3851 MSF and one channel interface attaches to the host processor. An available control unit position is required. See "Prerequisites" and "Limitations". **Field Installation:** Yes.

**Two-Channel Switch, Add'l (#8171):** Provides attachment for two additional channels to a 3830 mdl 3, providing three processor channel switch capability. **Limitations:** Only two of the three channel interfaces can be attached to channels on the same processor. **Maximum:** One ... see "Prerequisites" and "Limitations". **Field Installation:** Yes. **Prerequisites:** #8170.

**MODEL CONVERSIONS**

Model 2 can be field changed to a model 3. MES order for model change must include correct serial number and all installed and on-order features and RPOs on the 3830 model 2 to be changed. It must also include removal of any of the following which are installed: #9190, #9314, #9315, #9317, #9318, #9841. Prior to ordering the model change, installed and on-order RPOs should be resubmitted to IBM. Control Store Extension (#2150) and Two-Channel Switch (#8170) must be previously installed or installed concurrently with the model upgrade. For customers who wish to have an installed 3830 model 1 converted directly to a 3830 model 3, submit an RPO. The 3830 mdl 3 to mdl 2 conversion is not recommended for field installation.

**ACCESSORIES (None)**
**SUPPLIES (None)**

‡ ISC diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette. A fee on purchased machines to include any number of diskette-only changes ordered on the same diskette.

## 3833 MODEM

### PURPOSE

A 2400-bit modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). This advanced microprocessor-based modem significantly enhances communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing:

- Probable cause of network errors
- Alert messages on error threshold
- Formatted modem test results

### MODELS

**Model 001:** Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point multipoint control, or multipoint tributary mode.

**Customer Setup (CSU):** The 3833 is designated for customer setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. A modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches. Note: Some changes of the setup switches may require SYSGEN changes in the program support. (Except Canada > In countries where Customer Setup is prohibited or impractical, terms and conditions will include CE support for installation. IBM to determine if Customer Setup applies. <)

### HIGHLIGHTS

- Volume purchase price reductions are available for quantity purchases.
- The Warranty Option for IBM On-site Exchange service during warranty instead of Customer On-site Exchange service is ordered by specifying #9876 with the machine order.

### Standard Features

- Data Rate: 2400 bits with backup of 1200 bits.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (2400/1200 bits) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). This is a Customer selectable switch option.
- Automatic and Adaptive Equalization: P Equalization is automatically performed by the modem and continues to adapt while in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operates with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modem accepts commands and initiates tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provides the network operator with the most probable cause of network problems.

- Modem provides its own clocking or will accept DTE (external) clocking.

**Built-in diagnostics:** All modems (for modems on tail links, see "Tail Circuit Attachment" in the Accessories section) will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and quality and level of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by 303X, 308X, 4300, S/36 and 8100 processors for data transmission. Thus, diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA, implemented under the Network Communication Control Facility (NCCF) program product, has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results. The following program products at the stated level or subsequent levels, unless specified otherwise, may be used:

1. Network Problem Determination Application (NPDA) Version 3 Release 2.

**Note:** NPDA Version 3 Release 1 may be used but will not display the proper modem type number on Remote Self Test screen.

2. Network Communication Control Facility (NCCF) Release 2.
3. ACF/NCP Version 3. The S/36 System Support Program (5727-SS1) includes an online problem determination facility that uses the 3833 and 3834 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the S/36 operator console. These tests help the system operator locate the failing component (S/36, local modem, line, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the modem operator panel. These manual tests include:

- Modem self-test -- This includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance.
- Lamp test -- tests all indicator lights on the operator panel.

**Extended Diagnostics:** This 3833 standard function enhances the diagnostic capabilities of modems. It must be installed in both the local and remote modem (not standard with 3863 modem). It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. This function may not function properly in some countries on a multipoint line of normal quality.

**Maintenance Service:** It is a customer responsibility to determine when maintenance is required by using the Customer Problem Analysis and Resolution Guide provided with the machine. It is a

customer responsibility to call a designated telephone number for service according to one of the Maintenance Agreement options:

IBM On-Site Repair (IOR)  
IBM On-Site Exchange (IOE) #9830  
Customer On-Site Exchange (COE) #9824  
Customer Carry-in Exchange (CCE) #9816  
Customer Carry-in Repair (CCR) #9821

**Warranty:** The warranty period for the 3833 modem is one year. Warranty Service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) (Except Canada > or IBM On-Site Repair in countries where Exchange/Repair Services are not available. <) A warranty option provides, for an additional charge, the IBM On-Site Exchange (IOE) during the same period instead of the Customer On-Site Exchange. Order #9876 with machine order. The 3833 modem will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The service offering after warranty will be one of the Maintenance Agreement options described above.

**On-Site CPAR Assistance:** If a customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR) the customer calls the Marketing Representative who will arrange for CE/CSR on-site assistance. IBM will assist the customer on site in performing CPAR procedures using the same documentation that is available to the customer. On-site assistance is provided on a time and material basis.

#### Communication Facilities

**PTT Facilities:** Telecommunications lines of a normal quality for data transmission can be used. See IBM for the availability of such facilities in your country.

**Privately owned Communication Facilities:** Equivalent to above.

**International Facilities:** Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

(Canada only > Transmission of data between the United States and Canada is supported. The channel in Canada must be schedule 4, type 4. <)

**Related Equipment:** The 3833 Modem operates with IBM communication products capable of 2400 bits operation. See M2700 pages. The 3833 Modem must communicate with another 3833 or another appropriately configured 3863 or a 3863 Mdl 1. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Note:** The LPDA functions of the 3833 Modems will not operate satisfactorily when the IBM 3845 or 3846 Data Encryption Devices are used to encrypt data over the communication line.

**Customer Responsibilities:** Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the "Planning and Site Preparation Guide", GA33-0030.

The customer is also responsible for:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities."
3. Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.
4. Unpacking and placing of the 3833. Physical setup, and connection of cables at setup time. During the physical setup, the position of the configuration switches located on the rear

panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary). Details are in the "IBM 3833/3834 Customer Set-up and User's Guide", GA33-0029.

5. Performing customer problem analysis and resolution.

**Publications:** See KWIC Index, G320-1621, or specific systems bibliography.

#### SPECIFY

- (Canada only > Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0m (10 ft) power cable, non-locking plug (no specify code required). <)
- (Except Canada > Power (AC, 1-phase, 3-wire, 50/60 Hz): 3.0m (10 ft) power cable.  
100/127V - No specify code required  
200/240V - Specify #2806 <)

- The 3-digit country code is used to select a power cord and plug which meets the requirements of that country.

- Language Groups: The 3-digit country code is used to select a power cord and plug which meets the requirements of the country. In countries where two languages are available, select by specifying the alternate language.

(Except Canada >  
English #2924  
Japanese #2930  
Spanish #2931 <)  
(Canada only >  
English #2924  
French #2928 <)

Order via standard WTAAS ordering instructions.

- Telecommunications Cable (modem to telecommunications line connection): 7.5m (25 ft) (No specify code required).

#### SPECIAL FEATURES (NONE)

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

Order the appropriate part number via Parts and Supplies Requisition

**Rack Mount Shelf (P/N 8547412):** A rack adapter that fastens inside a standard 19 in. EIA rack. The adapter, which fits racks that have a depth of 60cm (23.6 in.) to 76cm (30 in.) and an opening of 45cm (17.7 in.) will hold two modems side-by-side.

**Tail Circuit Attachment (P/N 8547438):** Allows the 3833 to attach to 3865 Modem mdl1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. The 3833 must be in multipoint control mode only, set for external clocking. Limitations: If LPDA support is required on the tail link, 3833 can only be installed at the remote site of that tail link, a 3863-Mdl 1 with LPDA Support on Tail Link feature (#4791) being installed at the tailing site.

#### SUPPLIES (NONE)

## 3834 MODEM

### PURPOSE

A 4800-bit modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). This advanced microprocessor-based modem significantly enhances communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing:

- Probable cause of network errors.
- Alert messages on error threshold.
- Formatted modem test results.

### MODELS

**Model 1 001:** Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.

**Customer Setup:** The 3834 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. A modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches. Note: Some changes of the setup switches may require SYSGEN changes in the program support.

(Except Canada > In countries where Customer Setup is prohibited or impractical, terms and conditions will include CE support for installation. Contact IBM to determine if Customer Setup applies.<)

### HIGHLIGHTS

- Volume purchase price reductions are available for quantity purchases.
- The Warranty Option for IBM On-Site Exchange service during warranty instead of Customer On-Site Exchange service is ordered by specifying #9876 with the machine order. (Not available in all countries; contact your country headquarter.)

### Standard Features:

- Data Rate: 4800 bits with backup of 2400 bits.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (2400/1200 bits) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). This is a customer selectable switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt while in data mode.
- Operator Panel with optional status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modem accepts commands and initiates tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provides the

network operator with the most probable cause of network problems.

- Modem provides its own clocking or will accept DTE (external) clocking.

### Diagnostics

**Built-in diagnostics:** All modems (for modems on tail links, see "Tail Circuit Attachment" in the Accessories section) will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and quality and level of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by 303X, 308X, 4300, S/36 and 8100 processors for data transmission. Thus, diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA, implemented under the Network Communication Control Facility (NCCF) program product, has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The following program products at the stated level or subsequent levels, unless specified otherwise, may be used:

1. Network Problem Determination Application (NPDA) Version 3 Release 2.  
**Note:** NPDA Version 3 Release 1 may be used, but will not display the proper modem type number on Remote Self Test screen.
2. Network Communication Control Facility (NCCF) Release 2.
3. ACF/NCP Version 3.

The S/36 System Support Program (5727-SS1) includes an online problem determination facility that uses the 3833 and 3834 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic test from the S/36 operator console. These tests help the system operator locate the failing component (S/36, local modem, line, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance.
- Lamp test -- tests all indicator lights on the operator panel.

**Extended Diagnostic:** This 3834 standard function enhances the diagnostic capabilities of modems. It must be installed in both the local and remote modem (not standard with 3864 modem). It provides

an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. This function may not function properly in some countries on a multipoint line of normal quality. A possible solution is to use a CCITT M1020 Line.

**Maintenance Service:** It is a customer responsibility to determine when maintenance is required by using the Customer Problem Analysis and Resolution Guide provided with the machine. It is a customer responsibility to call a designated telephone number for service according to one of the Maintenance Agreement options:

IBM On-Site Repair (IOR)  
IBM On-Site Exchange (IOE) #9830  
Customer On-Site Exchange (COE) #9824  
Customer Carry-in Exchange (CCE) #9816  
Customer Carry-in Repair (CCR) #9821

(Except Canada > Contact your country headquarters to determine which options are available in your country.)

**Warranty:** The warranty period for the 3834 modem is one year. Warranty Service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) or IBM On-Site Repair in countries where Exchange/Repair Services are not available. <)

A warranty option provides, for an additional charge, the IBM On-Site Exchange (IOE) during the same period instead of the Customer On-Site Exchange Order #9876 with machine order.

The IBM 3834 modem will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The service offering after warranty will be one of the Maintenance Agreement options described above.

**On-site CPAR Assistance:** If a customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR) the customer calls the Marketing Representative who will arrange for CE/CSR on-site assistance. IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer. On-site assistance is provided on a time and material basis.

## COMMUNICATION FACILITIES

**PTT Facilities:** Telecommunications lines of a normal quality for data transmission can be used. See IBM for the availability of such facilities in your country.

**Privately-owned Communication Facilities:** Equivalent to above.

**International Facilities:** Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

(Canada only > Transmission of data between the US and Canada is supported. The channel in Canada must be schedule 4, type 4. <)

**Related Equipment:** The 3834 Modem operates with IBM communication products capable of 4800 bits operation. See M2700 pages. The 3834 Modem must communicate with another 3834 or another appropriately configured 3864 or a 3868 Mdl 2. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Note:** The LPDA functions of the 3834 Modems will not operate satisfactorily when the IBM 3845 or 3846 Data Encryption Devices are used to encrypt data over the communication line.

**Customer Responsibilities:** Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the "Planning and Site Preparation Guide", GA33-0030.

The customer is also responsible for:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".
3. Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.
4. Unpacking and placing of the 3834. Physical setup, and connection of cables at setup time. During the physical setup, the position of the configuration switches located on the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the "IBM 3834/3834 Customer Set-Up and User's Guide", GA33-0029.
5. Performing Customer Problem Analysis and Resolution.

**Bibliography:** See KWIC Index, G320-1621, or specific systems bibliography.

## SPECIFY

- (Canada only > Voltage (120V AC, 1-phase, 3-wire, 60 Hz): 3.0m (10 ft) power cable, nonlocking plug (No specify code required). <)
- (Except Canada > Power (AC, 1-phase, 3-wire, 50/60 Hz): 3.0m (10 ft) power cable.  
100/127V - No specify code required  
200/240V - Specify #2806 <)
- The 3-digit country code is used to select a power cord and plug which meets the requirements of that country.
- Language Groups:  
(Except Canada > English #2924  
Japanese #2930  
Spanish #2931 <)  
(Canada only > English #2924  
French #2928 <)

Order via standard WTAAS ordering instructions.

**Telecommunications Cable:** (Modem to telecommunications line connection) 7.5m (25 ft) (no specify code required).

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

These items are purchase-only and must be ordered separately from the modem. Order the appropriate part number via Parts and Supplies Requisition.

**Rack Mount Shelf (P/N 8547412):** A rack adapter that fastens inside a standard 19 in. EIA rack. The adapter, which fits racks that have a depth of 60cm (23.6 in.) to 76cm (30 in.) and an opening of 45cm (17.7 in.) will hold two modems side-by-side.

**Tail Circuit Attachment (P/N 8547438):** Allows the 3834 to attach to 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. The 3834 must be in multipoint

control mode only, set for external clocking. Limitations: If LPDA support is required on the tail link, 3834 can only be installed at the remote site of that tail link, a 3864 mdl 1 with the LPDA Support on Tail Link feature (#4791) being installed at the tailing site.

**SUPPLIES (NONE)**

**3838 ARRAY PROCESSOR****PURPOSE**

An auxiliary processing unit for S/370 mdl 145, 148, 158, 168, 3031, 3032, 3033, 3081, 3083, 3084, 3090, 4361, 4381, 4341 Processor and the 3042 Attached Processor model 2, which attaches on a Block Multiplexer Channel. Processes single precision floating point vector operations found in seismic trace processing and other applications.

**MODELS**

<b>Model 1</b>	001	Contains 256K bytes of bulk storage
<b>Model 2</b>	002	Contains 512K bytes of bulk storage
<b>Model 3</b>	003	Contains 1,024K bytes of bulk storage

**Prerequisites:**

1. A control unit position on a system block multiplexer channel.
2. For S/370 mdl 168 configuration, if feature #7850 (Two-Byte Interface) is specified the 2880 must also have the appropriate Two-Byte Interface (#7850 or #7851).
3. For S/370 mdl 145, Word Buffer (#8810) is required on the 145 to achieve maximum rated block multiplexer transfer rate.
4. For a 3032 or 3033 Processor configuration if Two-Byte Interface (#7850) is specified, the 3032 or 3033, or 3042 Attached Processor mdl 2 channel to which the 3838 is to be attached must also have the appropriate Two-Byte Interface (#7850).
5. For a 3031, 3032, or 3033 Processor, and a 3042 Attached Processor mdl 2 configuration, if Data Streaming Feature (#4850) is specified on the 3838 with its prerequisite, the channel to which the 3838 attaches must also have the appropriate Data Streaming Feature (#4850) installed.

**Limitations:** Multiple 3838s; and/or other I/O devices on the same channel may degrade performance. The 3838 is supported only on S/370 mdls 145, 148, 158, 168, 4341, 4361, 4381 with OS/VS1, and mdls 158, 168, 3031, 3032, 3033, 3081, 3083, 3084, 4341, 4361, 4381 with OS/VS2 MVS. Multiple 3838 Array Processors attached to a single S/370 or 4341 Processor host should each have identical algorithm sets because VPSS allocates ports based only on bulk store partition size and shared versus exclusive usage.

**Minimum System Requirements:**

1. S/370 mdl 145, 148, 158, 168 or 3031, 3032, 3033, 3081, 3083, 3084, 3090, 4341, 4361, 4381 with block multiplexer channel.
2. Nine track, 1600 bpi PE magnetic tape (factory order note specifying type and density, if other).
3. MVS Release 3.8 or MVS/System Product Releases 1, 2 or 3, or System Extensions with MVS/Release 3.8. Additionally, the Vector Processing Subsystem (VPSS) Independent Release must be installed.

OS/VS1 Release 6 with Selectable Unit for Subsystem Attachment Support (SU6), and EREP (SU1).

CE maintenance and service capability is affected if any of the above are not part of the system configuration.

**HIGHLIGHTS**

Permits systems with a high content of vector processing operations to execute the vector work in parallel with processor host processing thereby releasing the processor for other multiprogrammed system tasks. User programmable by coding available instructions to define complete processing sequences. Contains five functional components each capable of overlapped or concurrent operation to sustain processing performance.

**Channel Interface:** Allows data and control information to transfer in block multiplexer mode at data rates of 1.5MB/sec. in single byte transfers with the processors listed above.

When attached at 3MB/sec. on a two-byte interface, to a S/370 mdl 168, a 3032, 3033 Processor, or a 3042 Attached Processor mdl 2, with the two-byte interface feature on the 3838, the 2880 channels on the 168 must be equipped with a similar feature (#7850 or #7851), and the 3032, 3033 and 3042 Attached Processor mdl 2 channels, to which it is attached, must be equipped with (#7850).

When attached to a 3031, 3032, 3033 Processor or the 3042 Attached Processor mdl 2, with data streaming feature on the 3838, in data streaming mode, at up to 3MB/sec., the Processors must be equipped

with Data Streaming Feature (#4850). (On the 3081, 3083, 3084, 4341, 4361 and 4381 data streaming is standard.)

**Bulk Storage:** Provides independent data storage for up to seven concurrent 3838 users. Seven is the upper limit on 3838 user partitions but is not restrictive of the number of host regions executing 3838 destined jobs. The user partitions may be shared or exclusive. Receives input data from the host and buffers for processing. During processing of algorithm sequences, provides initial, intermediate, and final result data storage. Final results are subsequently transmitted to the host under control of a pending CCW on the block multiplexer channel.

**Data Transfer Controller:** Provides multiplexing of the internal data busses for concurrent transfers of data between the functional elements.

**Arithmetic Processor:** Controls algorithm execution for processing vectors through the 100ns/stage pipelined arithmetic unit. Algorithms can be utilized in the application program of individual users to provide comprehensive processing techniques unique to each user. Algorithm control store may be expanded from the basic 16,384 bytes for all mdls with the control store additional feature (#1551) which provides an additional 16,384 bytes of control storage.

**Control Processor:** Manages the total 3838 subsystem functional operation, synchronizing all data transfers and arithmetic operations, performing logical decisions in algorithm chains, and sequencing multiple users problems through the array processor.

The Instruction Set includes the following vector processing algorithms and logic operations:

**Algorithm/Mnemonic:**

- a) Arithmetic Instructions (Standard)**
  - Vector Move (VMV)
  - Vector Move Convert (VMC)
  - Scalar Move (SMV)
  - Zero Move (ZMV)
  - Vector Floating Point to Fixed Point Conversion (VFX)
  - Convolving Multiply (CVM)
  - Quadratic Interpolation (INT)
  - Vector Element-by-Element Sum (VES)
  - Scalar Element-by-Element Sum (SSUM)
  - Vector Element-by-Element Multiply (VEM)
  - Scalar Multiply (SMY)
  - Sum of Squares (SSQ)
  - Fast Fourier Transform (Forward Real) (FTFR)
  - Fast Fourier Transform (Forward Complex) (FTFC)
  - Fast Fourier Transform (Inverse Real) (IFTR)
  - Fast Fourier Transform (Inverse Complex) (IFTC)
  - Complex Multiply (CEM)
  - Scalar Complex Multiply (SCEM)
  - Complex Multiply (Complex Conjugate) (CMCC)
  - Complex Multiply (Conjugate Output) (CMCO)
  - Scalar Complex Multiply (Conjugate Output) (SCMC)
  - Signed Square Array (SSA)
  - Sum of Vector Elements (SVE)
  - Array Scan for Maximum (MAX)
  - Vector Inner Product (VIP)
  - Vector Element Limit (LIM)
  - Divide (DIV)
  - Scalar Divide (SDIV)
  - Square Root (SQRT)
  - Nth Zero Crossing (NZCP/NZON)
  - Wiener-Levinson (WLEV)
- b) Arithmetic Instructions (Optional)**
  - Polynomial Expansion (POLY) (#9301)
  - Logarithm (LOG) (#9302)
  - Exponential (EXP) (#9303)
  - Tangent (TAN) (#9304)
  - Arctangent (ATAN/ATN2) (#9305)
  - Recursive Filter (REC) (#9307)
  - Vector Reverse (REV) (#9308)
- c) Logic/Index Instructions**
  - Move Index to Index (XMV)
  - Move Bulk Storage to Index (XMV5)
  - Move Index to Bulk Storage (XMVX)
  - Move Immediate to Index (XMI)
  - Add Index to Index (XAD)
  - Add Immediate to Index (XADI)
  - Subtract Index from Index (XXSE)

**3838 Array Processor (cont'd)**

Subtract Immediate from Index (XSBI)  
Multiply Index times Index (XML)  
Multiply Immediate times Index (XMLI)  
Divide Index into Index (XDVI)  
Divide Immediate into Index (SDVI)  
Divide Index into Immediate (XDIR)  
Compare Index: Index (SC)  
Decrement and Compare Index: Index (XDC)  
Compare Floating Point Index: Index (XCF)  
Compare Floating Point Index: Immediate (XCFI)  
Compare Index: Immediate (XCI)  
Decrement and Compare Index: Immediate (XDCI)  
Branch on Count Loop (XBCT)  
Unconditional Branch (XGO)

**d) VPSS Instructions**

Label Definition (XID)  
Move Data to/from S/370/4341, 4361 or 4381 Processor and  
3838 Bulk Storage (VPUT/VGET)  
Move Data to/from S/370/4341, 4361 or 4381 Processor and  
3838 Index (VPUTX/VGETX)

A brief description of the vector processing algorithm follows:

**Vector Element Sum (VES):** The VES operation provides a resultant vector Y, the elements of which are a sum of the corresponding elements in vector X and vector or scalar U.

**Vector Element Mult., Scalar Mult., or Signed Square Array:** The VEM operation provides a resultant vector Y, the elements of which are a product of the corresponding elements in vectors X and U. The SMY operation is a special case of VEM for which U is a scalar quantity. The SSA operation uses the VEM algorithm with two specifications of the X array as the inputs. A sign control option exercised on the first call of the X array allows the sign of the X array to be retained.

**Vector Move Convert (VMC):** The VMC operation has four subforms, each of which load the Y vector from the X vector. One form (VMV) moves vectors in bulk store, the second form (VMC) converts the X vector from fixed point integer to floating point, the third form (SMV) is used to load a single value (scalar) into all locations of the Y vector, and the fourth form (ZMV) is a scalar load where zero is specified as the scalar value of X.

**Sum of Squares (SSQ) or Vector Inner Product (VIP):** The SSQ operation takes a vector X and multiplies it on an element-by-element basis with a replica of itself. It then performs an algebraic sum of these squared elements and returns the single element result to a single element Y. Its VIP operation multiplies on an element-by-element basis, a vector U by a vector X. It then performs an algebraic sum of the resultant products and generates a single element result, Y.

**Vector Floating Point to Fixed Point Conversion (VFX):** The VFX operation converts a copy of the floating point vector X into a fixed point format, and stores it in Y.

**Sum or Vector Elements (SVE):** The SVE operation performs an algebraic sum of the elements of an X vector and places the sum in a single element, Y.

**Array Scan For Maximum (MAX):** The MAX operation scans the input vector X and returns in the two element Y vector the maximum value (after application or sign control) and the count of which element in X had that value.

**Vector Element Limit (LIM):** The LIM operation replaces the elements of the input vector X with specified minimum and/or maximum values if the input values exceed specified minimum or maximum limit values.

**Convolving Multiply (CVM):** Resultant vector Y with elements that are a discrete model correlation of the elements in vectors X and U or, by appropriate transposition and translation of the elements in U or X, convolution may be performed.

**Divide (DIV):** The DIV operation divides input vector U (or scalar (SDIV)) by a second input vector X and places the result in output vector Y.

**Nth Zero Crossing (NZCP/NZCN):** The NZCP/NZCN operation scans an input vector X and returns in the Y vector:

- 1) The count of the element X that represents the Nth time the data transitioned between positive and negative, and
- 2) The total number of zero crossings. The scan may be in order of increasing index (NZCP) or decreasing index (NZCN).

**Quadratic Interpolation (INT):** The INT operation performs a table lookup and interpolation function on a table of given data, and set of indicators into this table. The interpolation calculation is along a parabola drawn two points to the left and one point to the right of the chosen location, except where the chosen location is within the first input interval in which case the interpolation is based on one point to the left and two points to the right of the chosen point.

**Complex Multiply (CEM):** The CEM operation provides a resultant vector Y with complex elements from input vectors X and U each of which have complex elements. The operation may be specified to perform Complex Multiply (CEM), Scalar Complex Multiply (SCEM), Complex Multiply (Complex Conjugate) (CMCC), Complex Multiply (Conjugate Output) (CMCO) or Scalar Complex Multiply (Conjugate Output) (SCMC).

**Square Root (SQRT):** The SQRT operation takes the square root or the magnitude of an input vector or scalar X and places the result in output vector or scalar Y.

**Wiener-Levinson Filter (WLEV):** The WLEV operation accepts as its input a characterization of a signal and the type of noise encountered when reading that signal, and produces as an output the coefficients for a digital filter to remove the noise. These coefficients are chosen to minimize the RMS error in the output of a filter when the input consists of the expected signal, plus noise of the expected type.

**Fast Fourier Transform (FFT):** The FFT operation forms the forward or inverse Fast Fourier Transform in either of two modes: one where the time domain data is known to be complex (FFTC and IFTC) and one where it is real data (FFTR and IFTR).

**Polynomial (POLY) (#9301):** The POLY operation applies up to a 24th order polynomial expansion to the input vector X using coefficients provided in the U vector. **Prerequisites:** If Recursive Filter (REC) (#9307) or certain Algorithm Design and Development Service additions have been selected in the standard machine, then Arithmetic Element Control Storage Additional (#1551) is required.

**Logarithm (LOG) (#9302):** The LOG operation determines the logarithm to the base e of an input vector X. **Prerequisites:** POLY (#9301) and Arithmetic Element Control Storage Additional (#1551).

**Exponential (EXP) (#9303):** The EXP operation provides the antilog to the base e of an input vector X. **Prerequisites:** POLY (#9301) and Arithmetic Element Control Storage Additional (#1551).

**Tangent (TAN) (#9304):** The TAN operation provides the tangent Y of an input vector X. **Prerequisites:** POLY (#9301) and Arithmetic Element Control Storage Additional (#1551).

**Arctangent (ATAN) (#9305):** The ATAN operation provides the arctangent Y of an input vector X. The range of Y is 0 to pi radians. **Prerequisites:** POLY (#9301) and Arithmetic Element Control Storage Additional (#1551).

**Arctangent 2 (ATN2) (#9305):** This alternate version of Arctangent, ATN2, provides the arctangent, Y, of two input vectors, X (X axis) and U (Y axis). The range of Y is 0 to 2 pi radians. **Prerequisites:** POLY (#9301) and Arithmetic Element Control Storage Additional (#1551).

**Recursive Filter (REC) (#9307):** The REC algorithm implements a first order recursion equation where the elements of Y are a function of: previous values of Y, a Y coefficient vector U, an input vector X, and a scalar coefficient which is the first element of the U vector. **Prerequisites:** If Polynomial Expansion (POLY) (#9301) or certain Algorithm Design and Development Service additions have been selected in the standard machine, then Arithmetic Element Control Storage Additional (#1551) is required.

**Vector Reverse (REV) (#9308):** The REV operation reverses the ordering of real data for an input vector X.

**Control Storage Requirements:** The instruction set available on the 3838 consists of logic operations which are executed in the control processor and vector operations which are executed by the arithmetic processor. The arithmetic processor contains a 16,834 byte reloadable control store which contains the algorithms necessary to accomplish the vector operations. These are loaded when the 3838 is IPL/IMPLed from the host system. Selected arithmetic instructions from the optional arithmetic algorithms may be added to the standard arithmetic algorithms, or additional algorithms may be added to the product via the Algorithm Design and Development Service capability. When the capacity of the 16,384 bytes or control store is exceeded it is necessary to add feature #1551 Control Storage Additional (see "Special Features").

**3838 Array Processor (cont'd)**

**Algorithm Prerequisites:** Prerequisite machine or specify features for optional algorithms are as follows:

1. Vector Reverse (REV) (#9308) and either POLY (#9301) or REC (#9307) can be added to the standard machine.
2. Polynomial Expansion (POLY) (#9301) is a prerequisite for LOG (#9302), EXP (#9303), TAN (#9304) and ATAN/ATN2 (#9305).
3. Any or all of the remaining optional algorithms (POLY) (#9301) or REC (#9307), LOG (#9302), EXP (#9303), TAN (#9304) and ATAN/ATN2 (#9305) require Arithmetic Element Control Storage Additional (#1551).
4. Algorithms provided by the Algorithm Design and Development Service may or may not require Arithmetic Element Control Storage Additional (#1551) depending upon optional algorithm selections or complexity.

**Bibliography:** GC20-0001

**SPECIFY**

- Power (AC, 3-phase, 4-wire, 60 Hz): Must be consistent with system voltage. Specify #9903 for 208V, #9905 for 230V. **Field Installation:** Yes. **Note:** 50 Hz sources will require a 50/60 Hz converter.
- Color: Specify #9041 for Red, #9042 for Yellow, #9043 for Blue, #9045 for Gray, #9046 for White.
- Cabling: #9080 for below floor, #9881 for on floor. **Field Installation:** Yes.
- Configuration: #9092 for additional 3838s in configuration (excludes first unit).
- Arithmetic Instructions
 

Polynomial Expansion #9301	Arctangent #9305
Logarithm #9302	Recursive Filter #9307
Exponential #9303	Vector Reverse #9308
Tangent #9304	

**SPECIAL FEATURES**

**Two-Byte Interface (#7850):** Provides two-byte parallel transfer on the 2880 Block Multiplexer Channel to achieve data transfer rates up to 3.0MB/sec. **Maximum:** One. **Prerequisites:** #7850 or #7851 on 2880, or #7850 on a 3032, 3033, or 3042 Attached Processor mdl 2. **Field Installation:** Yes.

**Data Streaming Feature (#4850):** Provides attachment of the 3838 in Data Streaming Mode to channels on the 303X, 3042 Attached Processor mdl 2, 4341, 4361, 4381, 3081, 3083, and 3084. **Limitations:** The 3838 must be transferring data to and from the host processor channels in 4-byte (full word) multiples. **Maximum:** One per 3838. **Prerequisites:** On the 3838, #7850 is a prerequisite. If attached to the 303X and 3042 mdl 2, #4850 is required on the processor. **Field Installation:** Yes. Parts removed in the installation of this feature become the property of IBM.

**Arithmetic Element Control Storage, Add'l (#1551):** An additional 16,384 bytes of control store for additional algorithm capabilities. Custom algorithms are requested by Algorithm Design and Development Service. **Maximum:** One. **Field Installation:** Yes.

**MODEL CONVERSIONS**

Field Installable.

**ACCESSORIES** (None)

**SUPPLIES** (None)

## 3843 LOOP CONTROL UNIT

### PURPOSE

A signal converting unit used to provide loop capability at remote locations via a telecommunications link to one of the following:

- IBM 3630 Plant Communication System
- IBM 4331 Mdl Group 1 or 2 Processor
- IBM 8100 Information System.

The 3843 must be installed at the same site as the loop. The 3843 controls loop operation and provides an EIA/CCITT interface for attachment of an external synchronous modem. External non-IBM modems may be attached subject to the Multiple Supplier Systems Bulletin. Refer to M2700 pages.

### MODELS

Model 1 001

### HIGHLIGHTS

A 3843 loop may be up to 3.2 cable-kilometers (2 cable-miles) in length. All terminals that can attach to a 3631/3632 loop, a 3842 loop, an 8100 direct-attached loop or 4331 loop via the 4331 loop adapter may be attached to the 3843 loop. The 3843 controls polling and with one poll command addressed to it, can provide responses from all loop-attached terminals.

The 3843 operates at loop speeds of up to 9600 bps and will transmit/receive data over the telecommunication link at a speeds of 2400, 4800, or 9600 bps.

**Communications:** The 3843 functions with a synchronous modem (modem clocking) that transmits at 2400, 4800, or 9600 bps on a 2- or 4-wire half-duplex nonswitched telecommunication link, with or without backup on the public switched network. The electrical characteristics of the EIA/CCITT interface comply with EIA recommendations RS-232-C and RS-334 (for U.S.), CCITT recommendations (1976) V.24/V.28, ISO standard 2110 and other relevant CCITT recommendations. The interface supports modems functioning as recommended in CCITT V.26, V.27, V.27 and V.29. The 3843 also supports the test control line used by IBM modems. IBM modem attachment support:

Modem	Speed (bps)	Lines
3833 mdl 1	2400	Nonswitched voice grade
3834 mdl 1	4800	Nonswitched voice grade
3863 mdl 1	2400/1200	Nonswitched voice grade
3864 mdl 1	4800/2400	Nonswitched voice grade
3865 mdl 1/2	9600/4800	Nonswitched voice grade
3868 mdl 1	2400/1200	Nonswitched voice grade
3868 mdl 2	4800/2400	Nonswitched voice grade
3868 mdl 3/4	9600/4800	Nonswitched voice grade
3872 mdl 1	2400/1200	Nonswitched voice grade
5811 mdl 10	2400 to 9600	Limited Distance Modem
5811 mdl 18		Rack mount

5811 mdl 20	2400 to 9600	version of mdl 10 Nonswitched baseband Rack mount version of mdl 20
5812 mdl 10	2400 to 19200	Nonswitched baseband Rack mount version of mdl 10
5812 mdl 18		Nonswitched voice grade Rack mount version of 5865 mdl 2
5865 mdl 2/3	9600/7200 4800	
5868 mdl 52		

**Note:** 4-wire Switched Network Backup is available on 3863, 3864, and, 3865 modems with feature #7953 installed. 2-wire Switched Network Backup is available on 5865 modem with feature #7952 installed. See your TCM branch/TP coordinator for country limitations.

**Nonswitched Lines:** PTT (common carrier)-provided telecommunication lines of voice grade quality. The actual line specification is dependent upon the attached modem selected to support the 3843. Duplex 4-wire required for multipoint and also recommended for point-to-point.

**Privately-Owned Communication Facilities:** Equivalent to the above.

**Public Switched Telecommunication Networks:** The customer must be advised that satisfactory data transmission depends on the characteristics of the particular switched network facilities being used. Refer to M2700 pages for further details.

**International Facilities:** Transmission of data between the United States and Canada on nonswitched facilities is supported (US type 3002, Canada schedule 4, type 4). For Data transmission between all countries, request your country TP coordinator to contact the coordinator in the other countries involved to determine the availability of the required telecommunication facilities.

**Related Equipment:** The 3843 communicates with an appropriately configured 3631 or 3632 with EIA/CCITT Interface - Data Link (#3703) and Data Link Adapter (#3211), a 4331 Mdl Group 1 or 2 Processor with Data Link Adapter (#4840) or to an 8100 system with EIA Interface Adapter (#3701) and Communications Adapter Without Clock - SDLC (#1602). For communications capabilities, product utilization and special features, refer to M2700, 3630, 3631, 3632, 4331, 8101, 8130, and 8140 pages.

**Problem Determination Aids:** Can execute online diagnostic commands to perform self-tests, to assist in locating loop wiring or terminal failures at the remote site.

A Speed Select Switch is provided. This allows the 3843 to switch loop data speed to half-speed providing the externally attached modem has a half-speed capability. Modems with this capability can also be remotely switched to half-speed operation via the Speed Select Switch if they provide a 'Data Rate Select' control line to the 3843.

Off-line tests are provided to perform self tests of the 3843 with or without involving loop wiring and/or loop terminals.

**Physical Environments:** The 3843 Loop Control Unit has been designed for operation in physical environments characteristic of office areas. See "IBM 3630 Plant Communication System, System Description", GA24-3652 or "Introduction to the 8100 Information System", GA27-2875.

## MACHINES

**Customer Responsibilities:** The customer must be informed of his responsibilities as detailed in the M2700 pages and the pertinent section of the "IBM 3630 Installation Manual Physical Planning", GA24-3675, and the "IBM System 3630 Plant Communications System Loop Installation - Physical Planning", GA24-3676, or the "IBM 8100 Information System Site Planning and Preparation Guide for IBM 8101, IBM 8130, IBM 8140", GA27-2844, or the "4331 Processor Installation Manual-Physical Planning", GA24-3667.

The customer is responsible for the following:

1. Arrangement for price quotations, installation and all costs of external modem and its associated equipment, services, and telecommunication facilities.
2. Purchase, installation, testing, and maintenance of the loop cabling systems. Purchase a Loop Continuity and Relay Tester, if required. (See "IBM 8100 Information System Loop Installation Manual - Physical Planning", GA27-2878, or the "4331 Processor Installation Manual-Physical Planning", GA24-3667.
3. When installed on a 3630 Plant Communication System, the 3843 must be installed near a 3643. When installed on an 8100 System, the 3843 must be installed near a 3276 Control Unit Display Station, a 3278 Display Station, or an 8775 Display Terminal. When installed on a 4331 System, the 3843 must be installed near a 3641 or 3643 terminal when 3640 terminals are attached, when only 3287, 3775, 3276, or 3274 with their associated terminals are attached, test invocation is only possible from the Operator's Console. These devices are required for remote loop installation, problem determination procedures, and maintenance.
4. Providing voice communications between the 3843 and the controller/processor locations to coordinate tests. The voice facility must be located in such a way that the operator can use it while operating the controls on the front of the 3843.
5. Providing a wrap type Loop Station Connector for the 3843.
6. Physical setup, connection of cables to communication lines/modems and IBM devices incorporating protected customer access areas, switch settings and check out.
7. Contact Customer Engineering to make cable connections of IBM CSU units to non-CSU units where access areas are not provided.

**Bibliography:** IBM 3630 Plant Communication System, System Description, GA24-3652

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

### Power (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
123.5V #2811	200V #2732
200V #2806	208V #9902
220V #2813	230V #9904
235V #2814	

Notes: 235V AC is compatible with existing 240V AC Systems.  
115V AC is compatible with existing 120V AC Systems.

### Machine Nomenclature:

English #2927	German #2929
French #2928	

### Power Cord: #2710 for 50 Hz -- #2906 for 60 Hz or for Japan 50 Hz.

### Related Equipment: To provide applicable documentation, specify #9560 if the 3843 will be part of a 3630 System, #9569 if the 3843 will be part of an 8100 System or #9565 if the 3843 will be part of a 4331 Processor.

### Loop Station Connector Cable: A 2.1m (7 ft) cable is provided as standard. If a 4.2m (14 ft) cable is desired, specify #9410.

### Interconnection Cable to Modem: A 6.0m (20 ft) interconnection cable is provided as standard for attachment to the modem. If other than a 6.0m cable is required, specify #9021 and indicate 10 for a 3.0m (10 ft) cable, 30 for a 9.0m (30 ft) cable, or 40 for a 12.0m (40 ft) cable. (Japan only) For additional adapter cable: If operation will be with an NTT modem, specify #2946.<)

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3848 CRYPTOGRAPHIC UNIT

### PURPOSE

An auxiliary unit that enciphers and deciphers data when attached to the Virtual Storage S/370 mdls 135-3 through 168, and the 4331, 4341, 4361, 4381, 3031, 3032, 3033, 3081, 3083, 3084, and 3090 Processors.

### MODELS

**Model 1 001**

**Prerequisites:** Each 3848 requires a control unit position on a block multiplexer or selector channel.

A key entry unit (accessory) must be available for use with the 3848.

For communication security, the 3848 and the Cryptographic Unit Support Program Product require terminals that include the Encrypt/Decrypt feature (#3680) and either the ACF/VTAM (Program Product #5735-RC2), Encrypt/Decrypt feature (#6010), or ACF/TCAM Version 2 (Program #5735-RC3).

### HIGHLIGHTS

Provides data encryption capability for file and communications applications. The encryption process implements the Data Encryption standard (DES) published by the U. S. National Bureau of Standards as Federal Information Processing Standard (FIPS) #46 January 15, 1977.

A block chaining mode of operation is used with the DES algorithm to further disguise formatted data.

The user selected master key is maintained securely in a special storage element protected by a battery during power off periods. The master key entry process is protected by a physical key.

Master key entry is performed via a small hand-held key entry unit available as an accessory.

Attachment can be to a block multiplexer or selector channel. The maximum data rate is 1.5 megabytes per second. When attached to channels capable of 3.0 megabyte/ second data streaming and operating in data streaming mode (CE selectable) the 3848 maximum data rate is 3.0 megabytes per second.

Definition of selected key-encrypting keys as two 56-bit values provides a greater effective key length than the single 56-bit DES key.

**Programming Support:** Support for the 3848 is provided by the Cryptographic Unit Support program product (5740-XY6). This program provides the access method, error recovery and error recording for one or more 3848 units. Additionally, it provides generation and management control functions for cryptographic keys.

**Customer Responsibilities:** Primary customer responsibilities for using the 3848 Cryptographic Processor are:

- Generating Cryptographic keys. The master key must be selected by the user. The Cryptographic Unit Support program product (5740-XY6) may be used to generate key-encrypting and data-encrypting keys.
- Providing adequate physical protection measures for the computer system to which the 3848 is attached. Access to the 3848 and the support program product should be limited to authorized users.
- Maintaining secure duplicate copies of the key-encrypting keys used. A lost key precludes decrypting and results in loss of data.

**Minimum Systems Requirements:** The 3848 was designed to operate with the Cryptographic Unit Support program product or its equivalent. In combination, these products assist in safeguarding sensitive information. Neither product alone can provide the same function or the same degree of security as this combination.

The use of the 3848 without the error recovery and recording functions of the Cryptographic Unit Support program product will reduce the availability and maintenance characteristics of the Cryptographic Unit.

The Cryptographic Unit Support Program Product is supported in OS/VS 2 MVS (Release 3.9) and OS/VS 1 environment. Use with OS/VS 1 requires the Basic Programming Extensions Program Product (5662-257).

Operation with the S/370 mdl 145 requires Advanced Control Program Support (#1001). Attachment to any channel of a mdl 145 with four selector channels installed, or to the third selector channel of a mdl 145 with three selector channels installed requires the Word Buffer (#8810) on the mdl 145.

**Bibliography:** GC20-0001

### SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Voltage (AC, 1-phase):

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble grey, #9066 for pearl white.

- Language Groups:

Canadian French #2935	Italian #2932
English #2924	Spanish #2931
French #2928	

### SPECIAL FEATURES (None)

### MODEL CONVERSIONS (None)

### ACCESSORIES

**Personalization/Key Entry Unit (#0501):** This item is available on a purchase-only basis. Order by feature number for delivery with the 3848 or by P/N 4407908 for delivery at any other time. To enter the master key and to facilitate certain service functions, one unit must be available at each site having one or more 3848 Cryptographic Units.

### SUPPLIES (None)

## 3851 MASS STORAGE FACILITY (MSF)

### PURPOSE

Large-capacity storage and control facility for the 3850 Mass Storage System (MSS) for attaching to S/370 models 145, 145-3, 148, 155II, 158, (Japan only > 158 submdl 2, <) 165II and 168, or a 3031, 3032, 3033, 3081, 3083, 3084, 3090 Processor, or a 4341 or 4381 Processor.

### MODELS

**A-Series:** One Mass Storage Control

**B-Series:** Two Mass Storage Controls -- one MSC is the active control -- the second is an alternate control.

Mdl	Capacity No of Cart.	Max Bytes (Bills)	Data Recding Devices	Data Recding Cntrl
A01/B01	706	35.3	2	1
A11/B11	2044	102.2	2	1
A21/B21	3382	169.1	2	1
A31/B31	4720	236.0	2	1
A02/B02	2044	102.2	4	2
A12/B12	3382	169.1	4	2
A22/B22	4720	236.0	4	2
A03/B03	3382	169.1	6	3
A13/B13	4720	236.0	6	3
A04/B04	4720	236.0	8	4

**Maximum:** Attaches to a maximum of four S/370s (any combination of UPs, MPs, APs) or 3031, 3032, 3033, 3081, 3083, 3084 or 3090 Processor Complexes (maximum two multiprocessor systems) or 4341 or 4381 Processors.

A maximum of two 3851 MSFs from the A-series of mdls or one 3851 MSF from the B-series of models can be included in the 3850 MSS.

In a 3850 MSS there is one active Mass Storage Control (MSC). It can address a total of eight 3850 MSS components: 3851 MSF control function, 3830 Storage Control mdl 3s, and Integrated Storage Controls (ISC) (#4650) with the Staging Adapter (#7220) on S/370 mdls 158 and 168. (Each ISC counts as two components). The number of 3850 MSS components addressed can be increased to 16 with installation of the MSC Twin Port Feature (#4901, #4902). A second MSC (either a B-series or the second A-series) may be designated as an alternate control.

**Limitations:** In a 3850 MSS configuration with one 3851 MSF (B-series) or two 3851 MSFs (A-series), both MSCs must be featured identically if complete backup is required. Note: On a 2880 Block Multiplexer Channel, Extended Unit Control Words (#3851, 3852) may be required to expand DASD device address capacity. The 155II System configuration is restricted by the maximum number of non-shared block multiplexer subchannels (in groups of eight). See the Channel Section of the Guide to IBM System/370 Model 155, GC20-1729, for description of assignment and number available. The total device addresses (real, virtual, non-existent, or non-Mass Storage System) SYSGENed may not exhaust the pool of nonshared UCWs. (Japan only > The same limitations apply to the 158 submdl 2, <.)

### HIGHLIGHTS

Included are the storage facility for data cartridges, Data Recording Devices (DRD) and their associated Data Recording Controls (DRC) for the transfer of data between the data cartridges and the 3350/3333/3330 Disk Storage devices, a Cartridge Access Station for the manual entry and removal of data cartridges, two accessors and their associated controls for the movement of data cartridges within

the 3851, and a Mass Storage Control (MSC) for control of the 3850 MSS.

**Prerequisites:** A control unit position on a S/370 or a 4341 or 4381 Processor, byte or block multiplexer channel for each MSC -- one for each A-series MSF, two for a B-series MSF.

A minimum of one 3830 Storage Control mdl 3 on S/370 mdls 145, 145-3, 148, 155II, 158, (Japan only > 158 submdl 2, <) 165II and 168, or a 3031, 3032, 3033, 3081, 3083, 3084, 3090 Processor, a 4341 or 4381 Processor or one Integrated Storage Control (#4650) with the Staging Adapter (#7220) on S/370 mdls 158 and 168.

A minimum of either two 3333 Disk Storage and Controls or two 3350 mdl A2/A2Fs. See "Note" on M3333 pages for feature changes required when 3333s are retained for use with a 3851.

Data Cartridges (P/N 2496971, Purchase Only) must be ordered separately; contact IBM.

**Publications:** GC20-0001

### SPECIFY

- Power (AC, 3-phase, 4-wire): Must be consistent with system voltage.
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819	
- Color: The accent panels above and below the cartridge access station are white. The two end covers on the 3851 MSF are gray. The remainder of the 3851 is available in #9041 for red, #9042 for yellow, #9043 for blue, #9045 for gray, or #9046 for white. Field Installation: Yes.
- In a 3850 MSS configuration with two A-series MSFs, specify #9120 for the designated primary 3851 MSF and #9121 for the secondary 3851 MSF.
- Language Groups:
 

English #2927	Japanese #2930
French #2928	Spanish #2931
German #2929	
- Specify #2886 for cover latch.

### SPECIAL FEATURES

**Note:** In a 3850 MSS configuration with one 3851 MSF (B-series) or two 3851 MSFs (A-series), both MSCs must be configured identically if complete backup is required.

**Mass Storage Control Twin Port (#4901, #4902):** (#4901 for A and B mdls -- #4902 for B mdls only) #4901 applies to the A-series MSC and the first MSC in a B-series. #4902 applies to the second MSC in a B-series, and requires #4901 as a prerequisite. Permits the MSC to address 8 additional, for a total of 16, 3850 MSS components: 3851 MSF control functions\*, 3830 Storage Control mdl 3s on S/370 mdls 145, 145-3, 148, 155II, 158, (Japan only > 158 submdl 2, <) 165II and 168, or 3031, 3032, 3033, 3081, 3083, 3084, 3090 Processor, or a 4341 or 4381 Processor, and ISC (#4650) with the Staging Adapter (#7220) on S/370 mdls 158 and 168. Each ISC has two paths and counts as two components.

\* In a 3850 MSS configuration with two A-series mdls there are two 3851 MSF control function components.

**Remote Switch Attachment (#6148):** To control the two-channel interfaces on the basic 3851 MSF from a remote configuration control panel. Also controls the Two-Channel Switch, Add'l (#8171) if installed. For B mdls, this feature is associated with the primary MSC and must be installed in addition to #6150 below, which is associated with the alternate MSC. Field Installation: Yes.

**Remote Switch Attachment (#6150):** (B mdls) To control the two-channel interfaces on the basic 3851 (alternate MSC) from a remote configuration control panel. Also controls the Two-Channel Switch, Add'l (#8172) if installed. Field Installation: Yes. Prerequisites: #6148.

**Two-Channel Switch, Add'l (#8171):** Permits attachment to two additional S/370, 30XX, 4341, or 4381 processor channels, providing a total of four S/370, 30XX, 4341, or 4381 processor channel attachments. The channels can be on the same or different processors, to a maximum of four processors with no more than two channels to a single processor. For B mdls, the feature is associated with the active MSC and must be installed in addition to #8172 below, which is associated with the alternate MSC. Field Installation: Yes.

**Two-Channel Switch, Add'l (#8172):** (B mdls) Permits attachment to two additional S/370, 3090, 4341, or 4381 processor channels, providing a total of four S/370, 3090, 4341, or 4381 processor channel attachments. The channels may be on the same or different processors, to a maximum of four processors with no more than two channels to a single processor. Field Installation: Yes. Prerequisites: #8171.

#### MODEL CONVERSIONS

Field installable. Any A model can be upgraded to any larger A model or any B model. Any B model can be upgraded to any larger B model.

#### ACCESSORIES (NONE)

#### SUPPLIES (NONE)

## 3852 COLOR PRINTER AND JETPRINTER

### PURPOSE

The 3852 Color Printer and the Color Jetprinter 3852 2 Color Printer produce color graphics and text on transparencies and paper. Both are seven-color, bi-directional, all points addressable, drop-on-demand ink jet printers with the following resolutions:

3852 Model 1	84 X 84 pels per inch
Color Printer	84 X 63 pels per inch
3852 2	
Color Jetprinter	100 X 72 pels per inch (Draft text)

Attachments for these printers are as follows:

3852 Model 1	3270-PC,
Color Printer	3270-PC/G,
	3270-PC/GX
3852 2	
Color Jetprinter	3270-PC/G,
	3270-PC/GX,
	3179 Model G
	3192 Model G
	3979 Model 1

### MODELS

**Model 1 001 (Canada only > (No Longer Available) <)**

**Model 2 002**

**Customer Setup (CSU):** Both models are customer setup only. Customer setup allowance is one day. Setup documentation is included with each printer. No special tools are required.

### HIGHLIGHTS

These color printers provide convenient color graphics and text output in a quiet low-profile office printer. The 3852-2 provides enhanced text functions, including near letter quality and draft text, condensed print, and superscript and subscript printing. Print speed in the normal text mode is up to 30 characters per second in 10-pitch and 50 cps in 16.7-pitch. For the 3852 Color Printer it is up to 37 characters per second in 12-pitch.

When in the graphic modes, print speed is 3100 pels per second for both models.

- IBM PC, PC/XT, PC/AT, PCjr., PC Portable, and 3270-PC, 3270/PC/G, and 3270-PC/GX in Native PC mode (operating as a PC with DOS 2.1 or higher and not with the control program) (Model 2 only):
  - Supports a wide variety of text and graphics screen and file printing in black and colors from IBM and non-IBM software applications.
- 3179 Model G, 3192 Model G:
  - Color screen copy support is provided.
  - Host-directed alphanumeric-only print support is provided.
- 3270-PC Attachment:
  - In MFI sessions, the 3270-PC will support text screen copy only, which can be printed on either printer.
  - In PC session, the 3270-PC supports text screen copy and PC graphics screen copy (with the 3270-PC graphics adapter card) and either can be printed on the printers.
- Printer Dimensions:

Width - 400mm (15.75 in)  
Depth - 295mm (11.62 in)  
Height - 114mm (4.49 in)  
Weight - 5.6 kg (12.4 lbs)

**Standard Features:** Both 3852 Models 1 and 2 provide:

- Dual ink cartridges - one with black ink, the other with three primary colors, which allow the printing of seven colors:
  - Black
  - Blue
  - Cyan
  - Green
  - Magenta
  - Red
  - Yellow
- Capability for all-points-addressable color graphics.
- Special microperforated roll-feed paper. (A paper cutting edge is a standard feature.)
- Special cut-sheet paper with sheets being manually inserted.
- Special transparencies are available and are manually inserted.
- Two character sets are resident for standard character printing. The first character set is the 3270 Extended character set and includes multilingual support through the characters shown on Code Page 00500 of IBM Registry of Graphics Character Sets and Code Pages. The second character set is the PC Graphics Character Set 2.
- Six and eight lines per inch text supported.
- Normal and bold print intensities.
- Very quiet printing: 46 dBA.

**Model 1 Features:** Features unique to the 3852 Color Printer include:

- Printing pitch supported is 12-pitch

**Model 2 Features:** Features unique to the 3852 2 Color Printer include:

- Printing pitches of 5, 8.3, 10, and 16.7 characters per inch
- 8-inch writing line supported for both text and graphics
- 132 characters per line in condensed print
- Near letter quality as well as draft text
- Special microperforated continuous form paper is supported for use with the pin feed mechanism
- Resolutions of 100 X 96 pels per inch and 100 X 72 pels per inch
- Nine fonts available including superscripts/subscripts

**Control Panel:** The following switches are provided on the control panel:

Form Feed  
Line Feed  
On-Line/Off-Line

The following indicators are provided on the control panel:

Ready  
Check  
Power

Other switches include:

On/Off (Located on the right side of the printer)  
Bold Mode (Located On back panel of printer)

## Technical Data (Model 2 only)

- Acoustics - 46 dBA
- Maximum print width - 8 in. text
- Paper widths - 8 1/2 in. and 8.27 in. (A4 width)
- Paper Weights - 20 to 24 pounds.

**Note:** The 3852 Model 2 will print on most papers. For optimum color and print quality, special coated paper is recommended.

- Printer Speeds - Vary according to pitch used. (Bold mode printing is half of the speeds shown below.)

Characters /Inch Pitch	Print Speed Characters/Second Near Letter Quality	Draft Quality
5	10	15
8.3	16	25
10	20	30
16.7	33	50

- Character Spacing: 5, 8.3, 10, and 16.7 characters/inch
- Line Spacing: 6 and 8 lines/inch
- Character Sets: 2 (of 230 characters each)
- Languages supported:
  - Danish, Dutch, English, Finnish, French, German, Italian, Norwegian, Portuguese, Spanish, and Swedish
- Fonts:
  - PC Graphics Character Set 2
  - 3270 Extended Character Set
- Ink Cartridges: 2 (One with black ink and one with 3 primary color inks)
- Printer Diagnostics:
  - Operator initiated at power on
  - Operator initiated print quality check
- Interface: IBM PC parallel interface
- Certification:
  - U/L 478, CSA 22.2 #154, VDE 871 and 806
  - IEC 380, TUV (GS Mark) EIF
- Power:
  - 120V +/- 10%, 60 Hz
  - 220/230/240 +/- 10%, 50 Hz
  - 100V +/- 10%, 50/60 Hz

## Paper Supply

- Cut sheet dimensions are 216mm width (8.5 in.) by 279mm length (11 in.).
- Roll paper width dimension is 216mm (8.5 in.). The continuous form, fan-fold paper is microperforated at 8.5 inches or 8.27 inches. Length dimension perforation for fan-fold paper is 11 inches.
- Paper and transparency thickness must be 0.095mm +/- 0.005mm.

**Attachment:** Attachment to all hosts is via an 8-bit PC parallel interface.

**Required Software:** IBM PC, PC/AT, PC/XT, PCjr, PC Portable: DOS Release 2.1 or higher, with print driver modification included. This print driver modification code is contained on the diskette which is shipped with each 3852 Model 2.

3270-PC: 3270-PC Control Program Version 2.0 for color screen copy.

## Operating Environment

Temperature - Class B. 18 to 32.0 degrees C (60 to 90 degrees F)  
Relative Humidity - 20 to 80 percent

**Printer Compatibility Legend:** A -- The software application will function with the IBM PC Graphics Printer (5152).

- a - Same as "A" above but some restrictions apply
- B - Same as "A" plus color text
- C - Same as "A" plus color graphics
- D - Same as "A" and color text and color graphics are supported
- d - Only color screen copy is supported
- E - Same as "A" with some enhancements supported
- N - Not recommended by software publisher

## SPECIFY

### Model Type

- 3852 Model 1 Color Printer - P/N 1348520
- 3852 2 (120V non-US) - P/N 1686265
- 3852 2 (220/230/240V) - P/N 1686266
- 3852 2 (100V) - P/N 1686267

**Note:** Each of the above part numbers for the 3852 Model 2 automatically configures the following printer types:

(P/N 1686265): Universal symbol control panel, 60 Hz, 120V AC +/- 10%, 0.3 Amps.

(P/N 1686266): Universal Symbol control panel, 50 Hz, 220/230/240V AC +/- 10%, 25 Watts.

(P/N 1686267): Universal symbol control panel, 50/60 Hz, 100V AC +/- 10%, 25 Watts

**Printer Cable:** Specify for each printer: For attachment of 3852 Models 1 and 2 to PC, PCjr, PC Portable, PC/XT, PC/AT, 3270-PC, 3270-PC/G, and 3270-PC/GX workstation control units:

P/N 1525612 #5612

I For attachment of the 3852 Model 2 to the 3179 Model G/3192 Model G terminal:

P/N 6342058 #2058

**Printer Power Cord:** Specify required if non-US printer.

Location	P/N
Australia	5640664
Hong Kong	5640662
New Zealand	5640664
Singapore	5640662
All Others	5640660

**Color:** (No Specify required) Pearl White.

**SPECIAL FEATURES (NONE)**

**SUPPLIES**

**Paper:**

- Roll Paper, P/N 6293884  
8-1/2 in. X 11 in. microperforated  
4 rolls/box
- Cut-Sheet Paper, P/N 6293935  
8-1/2 in. X 11 in.  
250 sheets/pkg.

**MACHINES**

- Continuous Fan-Fold Pin-Feed Paper, P/N 1669311  
8-1/2 in. X 11 in. (210mm X 279.3mm) microperforated  
250 sheets/pkg.
- Transparency Sheets, P/N 6293933  
8-1/2 in. X 11 in.  
50 sheets/pkg.

**Ink Cartridges:**

Black Ink Cartridge, P/N 6293886  
Color Ink Cartridge, P/N 6293888

**Font Selection:** No Specify required.

**ACCESSORIES (NONE)**

## 3863 MODEM

### PURPOSE

A 2400 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors -- alert messages on error threshold -- formatted modem test results.

### MODELS

- | **Model 001 (No Longer Available):** Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.
- | **Model 002 (No Longer Available):** Operates in half-duplex mode over 2-wire switched telecommunications networks. Operating mode is point-to-point.

**Customer Setup:** The 3863 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 1 modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches.

**Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

(Except Canada > In countries where Customer Setup is prohibited or impractical, terms and conditions will include CE support for installation. Contact IBM to find out if Customer Setup applies. <)

### HIGHLIGHTS

- Volume purchase price reductions are available for quantity purchases.
- A high density rack-mounted version of the 3863 mdl 1 is available for central teleprocessing installations. See section "Related Equipment" below and "M3868" pages.

### Standard Features

- Data Rate: 2400 bps with backup of 1200 bps.
- A microprocessor for signal processing.
- Auto Answer - Automatic answering of switched network calls - mdl 2 -- SNBU - mdl 1.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (2400/1200 bps) of the local modem. (Except Canada > Not available with V.26bis. <)
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- World Trade Public Switched Network Adapter is built in, which permits direct attachment to the Switched Network (when allowed by local PTT regulations).
- Conforms to CCITT Recommendation for Switched Network for V.26bis. Cannot use Automatic Remote Speed Selection.

- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. (Except Canada > (LPDA functions are not supported with V.26bis). <) Under control of these programs, the modem accepts commands and initiates tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either "Receive Signal Level Reporting" or "LPDA Functions on Tailed Links" is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). Note: The functions "Receive Signal Level Reporting", and "LPDA Functions on Tailed Links" are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to a 3705, 3720, 3721, 3725, or 3726 Communications Controller or equivalent. See M3705, 3720, 3721, 3725, 3726 pages for details.

**Optional Features:** See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-Wire Switched Network Backup: Provides backup for non-switched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- Direct Line Attachment: Provides the safety barrier required by the UK British Telecommunications for Data Terminal Equipment not meeting UK safety requirements.
- LPDA Functions on Tailed Links: Allows tailed 3863 mdl 1 to respond to LPDA diagnostic commands.

**Diagnostics:** Built-in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 or 9370 Processor for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report "Receive Signal Level", a 3863 mdl 1 must have serial number suffix code of HD or later. If the serial number suffix code is earlier, RPQ 8Q0317 must be installed.

To respond to LPDA commands, a 3863 tailed to a 3865 with Data Multiplexer feature #3620 must have LPDA Function on Tailed Links feature #4791 installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Prob-

able cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3863 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

### COMMUNICATIONS FACILITIES MDL 1

**PTT Facilities:** Telecommunications lines of a normal quality for data transmission can be used. See IBM for the availability of such facilities in your country.

Privately-owned Communication Facilities: Equivalent to above.

### COMMUNICATIONS FACILITIES MDL 2 AND MDL 1 WITH SWITCHED NETWORK BACKUP (#7953)

**Public Switched Network:** (Canada only> 2-wire switched line with an exclusion key telephone.<) (Except Canada> The characteristics of the switched line are those of the public switched network as described by the PTT in each country.<) The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

**International Facilities:** Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

(Canada only> Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4.<)

**Attachment to Facilities:** (Canada only> The cables supplied to attach the 3863 mdl 2 and the 3863 mdl 1 with Switched Network Backup (#7953) to the public switched network are terminated with spade lugs for attachment to a CBS type data coupler (WE 1001A, series 5 or later, or WE 1001F or equivalent) which is provided by the telecommunications service supplier.<) (Except Canada> The proper cable and terminating plug will be provided to each country which has customer setup. There will be a nonswitched cable, a switched cable or a nonswitched and two switched cables if Switched Network Backup (#7953) is added as a feature.

In the case of either Switched Network or Switched Network Backup, the modem includes the World Trade Public Switched Network Adapter (WT PSN Adapter) which permits direct attachment to the switched network in World Trade countries (when allowed by local PTT regulations). Contact IBM to determine whether the Switched Network modem or the Switched Network Backup feature is allowed in your country.<)

(Except Canada> Note: Each modem is configured for the country for which it is ordered. Line Adapters will vary by country.<)

(Canada only> An exclusion key telephone set<) (Except Canada> A telephone set (handset)<) is required with switched facilities at locations where calls will be originated. Two telephone sets are required with 4-Wire Switched Network Backup (#7953). Answer only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

**Related Equipment:** The 3863 Modem operates with IBM communication products capable of 2400 bps operation. See M2700 pages. The 3863 Modem must communicate with another appropriately configured 3863 Modem or with a 3868 mdl 1 Rack-Mounted Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Customer Responsibilities:** Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the "Introduction and Site Preparation Guide", (GA27-3200).

The customer is also responsible for:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".
3. Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device.
4. Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.
5. Unpacking and placing of the 3863. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the "IBM 3863/3864 Setup Instructions and User's Guide", (GA27-3216).
6. Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
7. Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
8. All three of the following program products must be installed for LPDA to function:

NCCF -- NPDA -- and ACF/NCP

See section "Standard Features" above for required release levels.

9. (Except Canada> The 3863 mdl 2 complies with CCITT recommendations V.25 (as it pertains to answering equipment) and V.26bis for operation over international public switched networks and is normally line compatible and suitable for transmission of data with other manufacturer's modems that comply with these recommendations. However, satisfactory

transmission of data cannot be guaranteed over all international connections.

In those cases where it is necessary (PTT regulations for example) for an IBM 3863 to communicate with another manufacturer's modem, it is the customer's responsibility to ensure that the non-IBM modem:

conforms to CCITT recommendations V.25 and V.26bis  
uses CCITT coding method alternative B  
uses ready for sending delay of 200 to 275 ms.

In the event of unsatisfactory transmission of data with a non-IBM modem, the customer must follow IBM problem determination procedures by connecting the 3863 to another 3863 prior to calling for service. < >

**Bibliography:** See KWIC Index, G320-1621, or specific systems bibliography.

## SPECIFY

- Power (AC, 1-phase, 3-wire): 3.0m (10 ft.) power cable.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #9901
220V #2813	127V #2823
230V #2821	200V #2732
240V #2801	208V #9902
	220V #2803
	240V #2831

- Specify #2998.
- The 3-digit country code is used to select a power cord and plug which meets the requirements of that country.
- Specify one of the following for power safety labels for the country of installation:

English/		
French	#0935	Italian #0932
English	#0924	Japanese #0930
French	#0928	Portuguese #0933
German	#0927	Spanish #0931

- (Except Canada > If one of the above is not specified, the power safety labels will be English (#0924). < >
- (Canada only > If one of the above is not specified, the power safety labels will be bilingual English/French (#0935). < >
- Language Groups:

Canadian		
French	#2935	German #2929
English	#2924	Japanese #2930
French	#2928	Spanish #2931

If one of the above is not specified, the language group will be in English (#2924).

- Telecommunications Cable (modem to telecommunications line connection): 7.5m (25 ft.) (no specify code required).

## SPECIAL FEATURES

**Fan-Out (#3901):** This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This

feature may also be used to allow up to three multiplexers, or communications controllers, at a central site to share the same 3863 Modem for backup purposes. In this case, although all of the machines attached to the 3863 will receive the incoming data simultaneously, the user switch-over procedure must ensure that only one machine is sending. Limitations: Mdl 1 only. Cannot be used with DTE external clocking. Cannot be installed with LPDA Functions on Tailed Links (#4791) or with Tail Circuit Attachment accessory. In countries where the UK British Telecommunications Safety Requirements are in effect and:

- When the SNBU feature (#7953) is used, order the DLA 2 feature (#2940) for each DTE that requires a safety barrier and is attached using the fan-out feature.
- When the SNBU feature (#7953) is not used, order one DLA 1 feature (#2939) if one or more of the DTEs attaching to the fan-out feature require the safety barrier.

Field Installation: Yes.

**LPDA Functions on Tailed Links (#4791):** This feature enables the 3863 mdl 1 that is attached by the Tailed Circuit Attachment accessory to a channel of a 3865 Modem with Data Multiplexer (#3260) and 3863 mdl 1 that are at the other end of the line to respond to LPDA commands. Required only on the 3863 attached to the 3865. Limitations: Mdl 1 only. Cannot be installed with Fan-Out feature (#3901). Operates only with data line procedures SDLC (NRZ or NRZI) and BSC (EBDIC or ASCII or Transparent). Field Installation: Yes. Prerequisites: Tail Circuit Attachment accessory. See Modem Diagnostic Functions in section "Standard Features" for required program products.

**Extended Diagnostic Card (#7930):** This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. This feature may not function properly in some countries on a multipoint line of normal quality. A possible solution is to use a CCITT M1020 Line. Limitation: This feature is for the mdl 1 only, and must be in both the local and remote modems. Field Installation: Yes. Prerequisite: See LPDA in "Highlights" for required program products on S/370 and 4300 processors.

**4-Wire Switched Network Backup (4W-SNBU) (#7953):** Available for all 3863 Modem mdl 1s (nonswitched line). Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3863 Modems. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3863 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire "switched" telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities" section. This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out, otherwise the first line is automatically dropped. Limitation: Not available on 3863 mdl 2.

In countries where the UK British Telecommunications Safety Requirements are in effect, the DLA 2 (#2940) must be used with the SNBU feature for each DTE that requires a safety barrier. Field Installation: Yes.

**Direct Line Attachment (DLA) (#2939, #2940):** These features apply only to countries where the UK British Telecommunications Safety Requirements are in effect. These modems meet the UK British Telecommunications Safety requirements specified for Data Communications Equipment. The required safety barrier to allow DTEs not meeting the UK Safety requirements is provided with the following DLA features. Contact IBM to identify the DTEs that require these features. Note: #2939 and #2940 provide safety barriers specifically designed for use with those IBM DTEs that do not meet the UK safety requirements. It is the customer's responsibility when using these modems and features with non-IBM DTEs to satisfy the British Telecommunications that the equipment complies with the requisite safety regulations.

**DLA 1 (#2939):** This feature is used with nonswitched lines without the SNBU feature (#7953) and will provide a safety barrier to all DTEs attached to the modem. Limitations: Not installed with the SNBU feature (#7953) or DLA 2 feature (#2940). Field Installation: Yes.

**DLA 2 (#2940):** This feature is used with switched lines, and non-switched lines with the SNBU Feature (#7953). One feature must be ordered for each DTE not meeting the UK Safety requirements that is attached to the modem. Limitations: Not installed with DLA 1 feature (#2939). Field Installation: Yes.

**MODEL CONVERSIONS (NONE)****ACCESSORIES**

These items are purchase-only and must be ordered separately from the modem.

**Shelf Adapter (P/N 8547412):** A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

**Tail Circuit Attachment (P/N 8547442):** Allows the 3863 mdl 1 or 3864 mdl 1 to attach to a 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. Limitations: To have the 3863s on a tailed circuit responding to LPDA commands, LPDA Functions on Tailed Links (#4791) must be installed on 3863 that is attached to the 3865. Cannot be used simultaneously with Fan-Out (#3901).

**SUPPLIES (NONE)**

## 3864 MODEM

### PURPOSE

A 4800 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors ... alert messages on error threshold ... formatted modem test results.

### MODELS

**Model 001 (No Longer Available):** Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point, multipoint control, or multipoint tributary mode.

**Model 002:** Operates in half-duplex mode over 2-wire switched telecommunications networks. Operating mode is point-to-point.

**Customer Setup:** The 3864 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows relocation of the unit without requiring IBM service personnel assistance. Customer accessible setup switches are provided on the rear panel to enhance adaptability of the modem. For example, the mdl 1 modem may be configured for point-to-point, multipoint control or multipoint tributary operation with the setup switches.

**Note:** Some changes of the setup switches may require SYSGEN changes in the program support.

(Except Canada > In countries where Customer Setup is prohibited or impractical, terms and conditions will include CE support for installation. Contact IBM to find out if Customer Setup applies. <)

### HIGHLIGHTS

- Volume purchase price reductions are available for quantity purchases.
- A high density rack-mounted version of the 3864 mdl 1 is available for central teleprocessing installations. See section "Related Equipment" below and M3868 pages.

#### Standard Features:

- Data Rate: 4800 bps with backup of 2400 bps.
- A microprocessor for signal processing.
- Auto Answer - Automatic Answering of Switched Network calls - mdl 2 ... SNBU - mdl 1.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (4800/2400 bps) of the local modem.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or re-

mote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:

1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either "Receive Signal Level Reporting" or "LPDA Functions on Tailed Links" is needed, Version 3 (PP 5668-920) is required.
3. ACF/NCP Version 2 (PP 5735-XX1).

**Note:** The functions "Receive Signal Level Reporting", and "LPDA Functions on Tailed Links" are not supported by this level.

- Modem provides its own clocking or will accept DTE (external) clocking.
- Conforms to CCITT Recommendation for Switched Network for V.27ter.
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100m (328 ft) long when the modem is attached to a 3705, 3720, 3721, 3725 or 3726 Communications Controller or equivalent. See M3705, 3720, 3721, 3725, 3726 pages for details.

**Optional Features:** See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-wire Switched Network Backup: Provides backup for non-switched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- Direct Line Attachment: Provides the safety barrier required by the UK British Telecommunications for Data Terminal Equipment not meeting UK safety requirements.
- LPDA Functions on Tailed Links: Allows tailed 3864 mdl 1 to respond to LPDA diagnostic commands.

**Diagnostics:** Built in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370 or 4300 processor or System/36 or 9370 Processor for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report Receive Signal Level, a 3864 mdl 1 must have serial number suffix code of or later. If the serial number suffix code is earlier, RPQ 8Q0318 must be installed.

To respond to LPDA commands, a 3864 tailed to a 3865 with Data Multiplexer (#3620) must have LPDA Function on Tailed Links (#4791) installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3864 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for a switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

### COMMUNICATIONS FACILITIES MDL 1

**PTT Facilities:** Telecommunications lines of a normal quality for data transmission can be used. See IBM for the availability of such facilities in your country.

**Privately-owned Communication Facilities:** Equivalent to above.

### Communication Facilities Mdl 2 and Mdl 1 with Switched Network Backup (#7953)

**Public Switched Network:** (Canada only) Two-wire switched line with an exclusion key telephone. (<) The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

**International Facilities:** Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

(Canada only) Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4. <)

**Attachment to Facilities:** (Canada only) The cables supplied to attach the 3864 mdl 2 and the 3864 mdl 1 with Switched Network Backup (#7953) to the public switched network are terminated with spade lugs for attachment to a CBS type data coupler (WE 1001A, series 5 or later, or WE 1001F or equivalent) which is provided by the telecommunications service supplier. (<) (Except Canada) The proper cable and terminating plug will be provided to each country which has customer setup. There will be a nonswitched cable, a switched cable or a nonswitched and two switched cables if Switched Network Backup (#7953) is added as a feature.

In the case of either Switched Network or Switched Network Backup, the modem includes the World Trade Public Switched Network Adapter (WT PSN Adapter) which permits direct attachment to the switched network in World Trade countries (when allowed by local PTT regulations). Contact IBM to determine whether the Switched Network modem or the Switched Network Backup feature is allowed in your country.

**Note:** Each modem is configured for the country for which it is ordered. Line Adapters will vary by country. (<)

(Canada only) > An exclusion key telephone set (<)

(Except Canada) > A telephone set (handset) (<) is required with switched facilities at locations where calls will be originated. Two telephone sets are required with 4-wire Switched Network Backup (#7953). Answer-only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

**Related Equipment:** The 3864 operates with IBM communication products capable of 4800 bps operation. See M2700 pages. The 3864 must communicate with another appropriately configured 3864 or with a 3868 mdl 2 Rack-Mounted Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Customer Responsibilities:** Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the Introduction and Site Preparation Guide, GA27-3200.

The customer is also responsible for:

1. Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
2. Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".
3. Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device.
4. Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.
5. Unpacking and placing of the 3864. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the "IBM 3863/3864 Setup Instructions and User's Guide", GA27-3216.
6. Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
7. Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
8. All three of the following program products must be installed for LPDA to function:

NCCF -- NPDA -- and ACF/NCP

See section "Standard Features" for required release levels.

9. (Except Canada) > The 3864 mdl 2 complies with CCITT recommendations V.25 (as it pertains to answering equipment) and V.26-ter for operation over international public switched networks and is normally line compatible and suitable for transmission of data with other manufacturer's modems that comply with these recommendations. However, satisfactory transmission of data cannot be guaranteed over all international connections.

In those cases where it is necessary (PTT regulations for example) for an IBM 3864 to communicate with another manufacturer's modem, it is the customer's responsibility to ensure that the non-IBM modem:

- conforms to CCITT recommendations V.25 and V.26-ter
- uses CCITT coding method
- uses Ready For Sending delay of 200 to 275 milliseconds.

In the event of unsatisfactory transmission of data with a non-IBM modem, the customer must follow IBM problem determination procedures by connecting the 3864 to another 3864 prior to calling for service.<)

**Publications:** See KWIC Index, G320-1621, or specific systems bibliography.

### SPECIFY

- Power (AC, 1-phase, 3-wire): 3.0m (10 ft) power cable.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #9901
220V #2813	127V #2823
230V #2821	200V #2732
240V #2801	208V #9902
	220V #2803
	240V #2831

- Specify #2998.
- The 3-digit country code is used to select a power cord and plug which meets the requirements of that country.
- Specify one of the following for power safety labels for the country of installation:

English/			
French	#0935	Italian	#0932
English	#0924	Japanese	#0930
French	#0928	Portuguese	#0933
German	#0927	Spanish	#0931

(Except Canada>If one of the above is not specified, the power safety labels will be English (#0924).<)

(Canada only>If one of the above is not specified, the power safety labels will be bilingual English/French (#0935).<)

- Language Groups:

Canadian	German	#2929
French	Japanese	#2930
English	Spanish	#2931
French		#2928

If one of the above is not specified, the language group will be in English (#2924).

- Telecommunications Cable (modem to telecommunications line connection): 7.5m (25 ft) (no specify code required).

### SPECIAL FEATURES

**Direct Line Attachment (DLA) (#2939, #2940):** These features apply only to countries where the UK British Telecommunications Safety requirements are in effect. These modems meet the UK British Telecommunications Safety requirements specified for Data Communications Equipment. The required safety barrier to allow DTEs not meeting the UK Safety requirements is provided with the following DLA features. Contact IBM to identify the DTEs that require these features. Note: #2939 and #3940 provide safety barriers specifically designed for use with those IBM DTEs that do not meet UK safety requirements. It is the customer's responsibility when using these modems and features with non-IBM DTEs to satisfy the British Telecommunications that the equipment complies with the requisite safety regulations.

**DLA 1 (#2939):** This feature is used with nonswitched lines without the SNBU feature (#7953) and will provide a safety barrier to all DTEs attached to the modem. Limitations: Not installed with the SNBU feature (#7953) or DLA 2 feature (#2940). Field Installation: Yes.

**DLA 2 (#2940):** This feature is used with switched lines, and non-switched lines with the SNBU Feature (#7953). One feature must be ordered for each DTE not meeting the UK Safety requirements that is attached to the modem. Limitations: Not installed with DLA 1 feature (#2939). Field Installation: Yes.

**Fan-Out (#3901):** (Mdl 1 only) This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This feature may also be used to allow up to three Multiplexers, or Communications Controllers, at a central site to share the same 3864 mdl 1 for backup purposes. In this case, although all of the machines attached to the 3864 will receive the incoming data simultaneously, the user switch-over procedure must ensure that only one machine is sending. Limitations: Mdl 1 only. Cannot be used with DTE external clocking. Cannot be installed with LPDA Functions on Tailed Links (#4791) or with Tail Circuit Attachment accessory. In countries where the UK British Telecommunications Safety Requirements are in effect and:

- When the SNBU feature (#7953) is used, order the DLA 2 feature (#2940) for each DTE that requires a safety barrier and is attached using the Fan-Out feature.
- When the SNBU feature (#7953) is not used, order one DLA 1 feature (#2939) if one or more of the DTEs attaching to the Fan-Out feature require the safety barrier.

Field Installation: Yes.

**LPDA Functions on Tailed Links (#4791):** This feature enables the 3864 mdl 1 that is attached by the Tailed Circuit Attachment accessory to a channel of a 3865 modem with Data Multiplexer (#3260) and 3864 mdl 1 that are at the other end of the line to respond to LPDA commands. Required on the 3864 attached to the 3865. Limitations: Mdl 1 only. Cannot be installed with Fan-Out (#3901). Operates only with data line procedures SDLC (NRZ or NRZI) and BSC (EBCDIC or ASCII or Transparent). Field Installation: Yes. Prerequisites: Tail Circuit Attachment accessory. See Modem Diagnostic Functions in section "Standard Features" for required program products.

**Extended Diagnostic Card (#7930):** (Mdl 1 only) This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. This feature may not function properly in some countries on a multipoint line of normal quality. A possible solution is to use a CCITT M1020 Line. Limitation: This feature is for the mdl 1 only, and must be in both the local and remote modems. Field Installation: Yes. Prerequisite: See LPDA in "Highlights" for required program product support.

**4-Wire Switched Network Backup (4W-SNBU) (#7953):** Available for all 3864 mdl 1s (nonswitched line). Provides backup for the non-switched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3864s. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.
- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3864 tributary modem equipped

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with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire "switched" telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities". This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out, otherwise the first line is automatically dropped. Limitation: Not available on 3864 mdl 2. In countries where the UK British Telecommunications Safety Requirements are in effect, the DLA 2 (#2940) must be used with the SNBU feature for each DTE that requires a safety barrier. Field Installation: Yes.

**MODEL CONVERSIONS (NONE)****ACCESSORIES**

These items are purchase-only and must be ordered separately from the modem.

**Shelf Adapter (P/N 8547412):** A shelf adapter that fastens inside a standard 19 inch EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

**Tail Circuit Attachment (P/N 8547442):** Allows the 3863 mdl 1 or 3864 mdl 1 to attach to a 3865 Modem mdl 1 equipped with Data Multiplexing (#3260). Permits an extension of a network via a separate set of modems and a separate communications channel. Limitations: To have the 3864's on a tailed circuit responding to LPDA commands, LPDA Functions on Tailed Links (#4791) must be installed on 3864 that is attached to the 3865. Cannot be used simultaneously with Fan-Out (#3901).

**SUPPLIES (NONE)**

## 3865 MODEM

### PURPOSE

A 9600 bps modem used to provide communication products with a means for transmitting data over telecommunications channels (normally telephone lines). These advanced microprocessor-based modems significantly enhance communication network management and network problem determination. The modem diagnostic functions operate with Network Problem Determination Application (NPDA), providing probable cause of network errors -- alert messages on error threshold -- formatted modem test results.

### MODELS

**Model 001:** Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in point-to-point mode.

**Model 002:** Operates in half-duplex or duplex mode over 4-wire nonswitched duplex facilities. Operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station.

**Limitations:** The 3865 mdl 002 can be used only in a multipoint network. A multipoint network can be implemented with only one tributary. Additional stations can be added as the network expands. The 3865 mdl 002 cannot be used in a point-to-point mode, like a 3865 mdl 001. Neither can a 3865 mdl 001 be used in a multipoint network, like a 3865 mdl 002. Model conversion is not possible. See "Network Configuration" in "IBM 3863, 3864 and 3865 Modems Introduction and Site Preparation Guide", GA27-3200.

**Customer Setup:** The 3865 is designated for Customer Setup (CSU). This provides the customer with early availability. This also allows nonswitched duplex facilities. Operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station. For example, the mdl 002 modem may be configured for multipoint control or multipoint tributary operation with the setup switches. Note: Some changes of the setup switches may require SYSGEN changes in the program support.

(Except Canada > In countries where Customer Setup is prohibited or impractical, terms and conditions will include CE support for installation. Contact IBM to find out if Customer Setup applies. <)

### HIGHLIGHTS

- Volume purchase price reductions are available for quantity purchases. See Z125-3260 and Z120-3257 for details.
- A high density rack-mounted version of the 3865 mdl 001 and 002 is available for central teleprocessing installations. See section "Related Equipment" below and M3868 pages.

### Standard Features:

- Data Rate: 9600 bps with backup of 4800 bps.
- Auto Answer: Automatic answering of switched network calls with Switched Network Backup.
- A microprocessor for signal processing.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed (9600/4800 bps) of the local modem (primary status). The network configuration of the remote modem must be secondary.
- Anti-Streaming: A multipoint tributary modem (mdl 002) can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.

- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic functions referred to as Link Problem Determination Aid (LPDA), operate with Systems Network Architecture (SNA) and associated program products. Under control of these programs, the modems accept commands and initiate tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of network problems. These program products are:
  1. Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).
  2. Network Problem Determination Application (NPDA) Version 2 (PP 5668-983). If either Receive Signal Level Reporting or LPDA Functions on multiplexed links is needed, Version 3 (PP 5668-920) is required.
  3. ACF/NCP Version 2 (PP 5735-XX1). Note: The functions Receive Signal Level Reporting, and LPDA Functions on multiplexed links are not supported by this level.
- Modem provides its own clocking or will accept DTE (external) clocking.
- Fast RFS: 24 millisecond Ready for Sending (RFS) Delay available for 3865 multipoint tributary modems. Customer switch option (24ms or 60ms).
- Extended Length Cable: The interconnecting cable between the business machine and the modem can be up to 100 meters (328 ft.) long when the modem is attached to an 3705, 3720, 3721, 3725, or 3726 Communications Controller or equivalent. See M3705, 3720, 3721, 3725, 3726 pages for details.

**Optional Features:** See "Special Features" for detailed description.

- Extended Diagnostic Card: Enables NPDA to differentiate between modem failures, line failures and remote modem power loss.
- 4-wire Switched Network Backup: Provides backup for non-switched telecommunications facilities.
- Fan-Out: Provides for the attachment of up to three telecommunicating machines to one modem.
- Direct Line Attachment: Provides the safety barrier required by the UK British Telecommunications for Data Terminal Equipment not meeting UK safety requirements.

**Diagnostics:** Built in diagnostics: All modems will respond to diagnostic commands from the system that help provide status of any modem in the link, its attached terminal, and the quality of the received signal over the communication facility. Test requests and responses utilize the same data path and controls that are used by S/370, 4300 processor, System/36, or 9370 processor for data transmission. Thus diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

To report Receive Signal Level, a 3865 must have serial number suffix code of GM or later. If the serial number suffix code is earlier, RPQ 8Q0319 must be installed.

The Network Problem Determination Application (NPDA) program product is an example of an IBM program product offering the capability to utilize the modem diagnostic functions for the collection, storage and retrieval of network error/management data. NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Prob-

able cause differentiates between errors in the communications controller, line, modem, modem interface or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results.

The System/36 Support Program (5727-SS1) includes an online problem determination facility that uses the 3865 built-in diagnostics. Using online problem determination, the system operator can invoke diagnostic tests from the System/36 operator console. These tests help the system operator locate the failing component (line, System/36, local modem, remote modem or remote workstation controller) when a remote workstation experiences data transmission problems.

In addition, tests can also be executed from the the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Modem/line transmit and receive tests -- allow testing of modem and line for switched network.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a wrap or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance. This test is only available when operating over 4-wire telecommunications facilities.
- Lamp test -- tests all indicator lights on the operator panel.

#### Communication Facilities

**PTT Facilities:** 3865 Modems mdl 001 and mdl 002 require CCITT M1020 channels.

**Note:** In some countries, lower cost facilities can be used.

On 3865 mdl 2, the short (24 millisecond) Ready for Sending Delay may be used.

**Privately-owned Communication Facilities:** Equivalent to above.

MDL 001 OR MDL 002 WITH SWITCHED NETWORK BACKUP (#7953)

**Public Switched Networks:** (Canada only > 2-wire switched line with an exclusion key telephone set. <) (Except Canada > The characteristics of the switched line are those of the public switched network as described by the PTT in each country. <) The customer must be informed that satisfactory transmission of data depends upon the characteristics of the particular switched network connection being used. Refer to the M2700 pages for further details.

**International Facilities:** Request IBM to contact IBM coordinators of the other countries involved to determine the availability of such facilities.

(Canada only > Transmission of data between the United States and Canada on nonswitched or switched facilities is supported. (For nonswitched operation, the channel in Canada must be schedule 4, type 4. <)

**Attachment to Facilities:** (Canada only > The cables supplied to attach the 3865 with 4-wire Switched Network Backup (#7953) to the public switched network are terminated with spade lugs for attachment to a CBS type data coupler (WE 1001A, series 5 or later, or WE 1001F or equivalent) which is provided by the telecommunications service supplier. <) (Except Canada > The proper cable and terminating plug will be provided to each country which has customer setup. There will be a nonswitched cable, a switched cable or a

nonswitched and two switched cables if Switched Network Backup (#7953) is added as a feature.

When equipped with the 4-wire SNBU feature (#7953), the modem includes the World Trade Public Switched Network Adapter (WT PSN Adapter) which permits direct attachment to the switched network in World Trade countries (when allowed by local PTT regulations). Contact IBM to verify that the SNBU feature is allowed in your country.

**Note:** Each modem is configured for the country for which it is ordered. Line Adapters will vary by country. <)

(Canada only > An exclusion key telephone set <) (Except Canada > A telephone set (handset) <) is required with switched facilities at locations where calls will be originated. (Two telephone sets are required with 4-wire Switched Network Backup (#7953).) Answer-only locations are not required to have a telephone set. However, for optimum problem determination capability, a telephone set is recommended.

**Related Equipment:** The 3865 operates with IBM communication products capable of 9600 bps operation. See M2700 pages. The 3865 must communicate with another appropriately configured 3865 or with a 3868 mdl 003 or 004 Rack-Mounted Modem unless multiplexing is used. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Customer Responsibilities:** Customers must be informed of their responsibilities as detailed in the M2700 pages, and in the site preparation section of the "Introduction and Site Preparation Guide", (GA27-3200).

The customer is also responsible for:

- Arrangements for price quotations, installation, and all costs of common carrier equipment and services.
- Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel. Also, arranging for the installation of the appropriate receptacle described in "Attachment to Facilities".
- Switched Telecommunications Network -- arranging for the telecommunications service supplier to install the appropriate communication service equipped with the required connecting device as described in "Attachment to Facilities" and for attaching the IBM-provided cable to the connecting device.
- Ensuring the availability of the interconnecting cable between the business machine and the modem because it must be supplied by the business machine.
- Unpacking and placing of the 3865. Physical setup, and connection of cables at setup time. During the physical setup, the position of the two configuration switches located at the bottom of the rear panel must be reviewed to ensure compatibility with the actual application. (Example: Point-to-point primary or secondary; multipoint control or tributary.) Details are in the "IBM 3865 Setup Instructions and User's Guide", GA27-3218.
- Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.
- Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
- All three of the following program products must be installed for LPDA to function.

NCCF -- NPDA -- and ACF/NCP.

See section "Standard Features" above for required release levels.

**Bibliography:** See KWIC Index, G320-1621, or specific systems bibliography.

## SPECIFY

- Power (AC, 1-phase, 3-wire): 3.0 meter (10 ft.) power cable.

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #9901
220V #2813	127V #2823
230V #2821	200V #2732
240V #2801	208V #9902
	220V #2803
	240V #2831

- Specify #2998.
- The 3-digit country code is used to select a power cord and plug which meets the requirements of that country.
- Specify one of the following for power safety labels for the country of installation:

English/		
French #0935	Italian	#0932
English #0924	Japanese	#0930
French #0928	Portuguese	#0933
German #0927	Spanish	#0931

(Except Canada>If one of the above is not specified, the power safety labels will be English (#0924).<)

(Canada only>If one of the above is not specified, the power safety labels will be bilingual English/French (#0935).<)

- Language Groups:

Canadian/		
French #2935	German	#2929
English #2924	Japanese	#2930
French #2928	Spanish	#2931

If one of the above is not specified, the language group will be in English (#2924).

- Telecommunications Cable (modem to telecommunications line connection): 7.5m (25 ft) (no specify code required).

## SPECIAL FEATURES

**Data Multiplexer (#3260):** This feature allows selection of a 4800 bps and 2400 bps subchannel. The modem multiplexes subchannel data into a single aggregate data stream -- this feature offers four channel configurations. When the 3865 is placed in half-speed mode, the aggregate data stream is transmitted at half speed and as a result the channel configurations will be automatically altered because of lower speed. Channel configurations are:

### Full-Speed Operation Channels

A	B	C	D
9600	-	-	-
4800	4800	-	-
4800	2400	2400	-
2400	2400	2400	2400

### Half-Speed Operation Channels

A	B	C	D
4800	-	-	-
4800	-	-	-
4800	-	-	-
2400	2400	-	-

All data sources are connected to the 3865 mdl 001 by separate EIA/CCITT interfaces. Multiplexer channels will permit attachment

to co-located terminals or tailed circuit extensions for network flexibility and cost savings. Tail circuit extensions allow co-located 3863 or 3864 modems equipped with the Tailed Circuit Attachment accessory to be attached to a 3865 channel. Modems so attached can extend the channel data path by its attached communications line and a second (remotely attached) modem. Each multiplexer channel is equipped with buffers to compensate for timing variations between tailed modems and the 3865 clocks. Limitations: Mdl 001 only. Cannot be installed with Fan-Out feature (#3901). Tailed 3863 or 3864 modems must be mdl 001 only, multipoint control mode only, set for external clocking. LPDA diagnostic commands to a Data Multiplexed Link are received only on Channel A of the 3865 with Data Multiplexer feature attached to the host DTE. In order for this 3865 to respond to LPDA commands, it must have serial number suffix code of DG or later. If the serial number suffix code is earlier, MES #323406 must be installed. In countries where the UK British Telecommunications Safety Requirements are in effect and:

- When the SNBU feature (#7953) is used, order the DLA 2 feature (#2940) for each DTE that requires a safety barrier and is attached using the data multiplexer feature.
- When the SNBU feature (#7953) is not used, order one DLA 1 feature (#2939) if one or more of the DTEs attaching to the data multiplexer feature require the safety barrier.

Field Installation: Yes.

**Fan-Out (#3901):** This feature allows attachment of up to three telecommunicating machines to one modem. See M2700 pages for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used as a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified terminals without any additional user involvement. This feature may also be used to allow up to three Multiplexers, or Communications Controllers, at a central site to share the same 3865 for backup purposes. In this case, although all of the machines attached to the 3865 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. Limitations: Cannot be installed with DTE external clock, or Data Multiplexer (#3260). In countries where the UK British Telecommunications Safety Requirements are in effect and:

- When the SNBU feature (#7953) is used, order the DLA 2 feature (#2940) for each DTE that requires a safety barrier and is attached using the data multiplexer feature.
- When the SNBU feature (#7953) is not used, order one DLA 1 feature (#2939) if one or more of the DTEs attaching to the data multiplexer feature require the safety barrier.

Field Installation: Yes.

**Extended Diagnostic Card (#7930):** This feature enhances the diagnostic capabilities of nonswitched modems when it is installed in both the local and remote modem. It provides an additional test that enables NPDA to differentiate between modem failures, line failures and remote modem power loss. This feature may not function properly in some countries on a multipoint line of normal quality. A possible solution is to use a CCITT M1020 Line. Limitation: This feature must be in both the local and remote modems. Field Installation: Yes. Prerequisite: See LPDA in "Highlights" for required program product support.

**4-Wire Switched Network Backup (4W-SNBU) (#7953):** Provides backup for the nonswitched telecommunications facility. Data rate in 4W-SNBU mode is the same as in normal nonswitched line mode. 4W-SNBU allows restoration of the 4-wire service between two point-to-point or multipoint 3865s. For point-to-point configurations, except for the requirement to establish the switched connections, 4W-SNBU allows continuation of service with no operational or programming impact. For multipoint configurations, operational (and possibly programming) modifications are required. 4W-SNBU can be configured in two ways:

- The 4W-SNBU feature is installed on the normal multipoint control station modem and on any tributary modems that require backup. To establish a backup path to any tributary, the

control station modem must go to SNBU mode. In doing so, communication is broken to all other tributaries.

- A spare control station modem equipped with the 4W-SNBU feature is installed on a spare port at the control station location. The spare control station can then establish a 4W-SNBU connection to any 3865 tributary modem equipped with the 4W-SNBU feature. This tributary is deactivated from its normal polling list and assigned to the spare port. The normal control station continues to provide service to other tributaries still reachable over the nonswitched line.

This feature requires two 2-wire switched telephone lines, and two telephones at the host site. Attachment to the switched lines is made as described in the "Attachment to Facilities" section. This feature is designed to automatically answer when a call is received. Calls must be placed manually. When one call is placed and the connection completed, a four minute timer is started. The second line must be established within the time-out; otherwise the first line is automatically dropped. Limitations: It may be necessary to re-dial or change to half speed to maintain acceptable performance in SNBU mode. See "Customer Responsibilities" in the M2700 pages for details. In countries where the UK British Telecommunications Safety Requirements are in effect, the DLA 2 (#2940) must be used with the SNBU feature for each DTE that requires a safety barrier. Field Installation: Yes.

**Direct Line Attachment (DLA) (#2939, #2940):** These features apply only to countries where the UK British Telecommunications Safety requirements are in effect. These modems meet the UK British Telecommunications Safety requirements specified for Data Communications Equipment. The required safety barrier to allow DTEs not meeting the UK Safety requirements is provided with the following DLA features. Contact IBM to identify the DTEs that require these features. Note: #2939 and #2940 provide safety barriers specifically designed for use with those IBM DTEs that do not meet

UK safety requirements. It is the customer's responsibility when using these modems and features with non-IBM DTEs to satisfy the British Telecommunications that the equipment complies with the requisite safety regulations.

**DLA 1 (#2939):** This feature is used with nonswitched lines without the SNBU feature (#7953) and will provide a safety barrier to all DTEs attached to the modem. Limitations: Not installed with the SNBU feature (#7953) or DLA 2 feature (#2940). Field Installation: Yes.

**DLA 2 (#2940):** This feature is used with switched lines, and non-switched lines with the SNBU Feature (#7953). One feature must be ordered for each DTE not meeting the UK Safety requirements that is attached to the modem. Limitations: Not installed with DLA 1 feature (#2939). Field Installation: Yes.

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

These items are purchase-only and must be ordered separately from the modem.

**Shelf Adapter (P/N 8547412):** A shelf adapter that fastens inside a standard 19" EIA rack. The shelf, which fits racks that have an inside depth of 60cm (23.6 in.) to 76cm (30 in.) and an inside opening of 45cm (17.7 in.) will hold two modems side-by-side.

#### SUPPLIES (NONE)

## 3866 MULTIMODEM ENCLOSURE

### PURPOSE

The 3866 models 1 and 2 are multimodem enclosure. Model 1 can be mounted in a standard commercially available 19-inch rack cabinet and model 2 comes mounted in a mini cabinet for one enclosure only. These enclosures provide housing, cooling and power for the 3868 models 1 to 4 rack-mounted modems.

### MODELS

**Model 1 001:** Multimodem Enclosure for installation in commercial standard 19-inch rack cabinet.

**Model 2 002:** Multimodem Enclosure with single enclosure cabinet.

**Customer Set-Up (CSU):** The 3866 multimodem enclosures and associated power and fan units are designated to be set up by the user thereby offering the customer availability and relocation flexibility.

### HIGHLIGHTS

The 3866 mdl 1 and 2 are multimodem enclosures providing housing, powering and cooling for 3868 mdls 1 to 4 modem packs. Up to 12 single-width modem packs (3868 mdl 1) or up to six double-width modem packs (3868 mdl 2, 3 and 4) or six 5868 Rack Mounted Modems can be housed in an enclosure.

The 3866 mdl 1 multimodem enclosure must be installed in a standard 19-inch wide by 24-inch deep rack cabinet to be provided by the customer. Standard cabinets are available to accommodate several enclosures and mandatory fan units. Up to six enclosures and three mandatory fan units can be housed in a six foot high cabinet.

The 3866 mdl 2 multimodem enclosure is already mounted in an IBM provided mini cabinet.

For both mdls, a power unit and a fan unit must be ordered with each enclosure. In cabinet for multi enclosures only one fan unit is necessary per two enclosures (see "Special Features"). The customer may wish to replace a failing power unit with a spare and should be advised to order sufficient spare units.

**Optional Features:** See "Special Features" for detailed description.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate hardware ordering including Commercial Cabinet, where required, site preparation and setting up. For more information, refer to the "Planning and Site Preparation Guide" (GA33-0023).
- Receipt at the customer's receiving dock, unpacking and setting up the cabinet, enclosure, power and fan units.
- Performing 3866 check-out in accordance with supplied procedures for initial set up and relocation.
- Using customer problem determination procedures provided with the 3866 to determine the failing unit and filling out the appropriate 3866 problem report prior to (Canada only> taking action to get the failing unit exchanged<) (Except Canada> requesting maintenance service<) (See "Maintenance" below).
- Procuring any required spares.

**(Canada only> Warranty Service:** The warranty period is three years. Warranty service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amend-

ment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) as described below.

**Customer On-Site Exchange (COE):** It is the customer's responsibility to set up the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements.

It is the customer's responsibility to disconnect the element(s) and call a designated number to have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM.

The 3866 will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The service offering after warranty will be Customer On-Site Exchange (COE).

**Maintenance:** The level of maintenance service on a rental (MRC) machine is Customer On-Site Exchange (COE). Maintenance service is provided under the Amendment for IBM Service/Exchange Center services.

**On-Site Assistance:** If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), he may call for assistance on a toll free number. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. IBM assistance is billable at the application rates and terms.< )

**(Except Canada> Maintenance:** Maintenance of 3866s is available under the IBM Maintenance agreement for on-site maintenance. It is the customer's responsibility to set up the equipment and to determine when maintenance is required.

On-site maintenance is provided during the warranty period.

Repair of the 3866 and its features will require the availability of the 3866 to the Customer Engineer. If the customer has restored service with the use of spare elements, it will be necessary for the customer to turn the 3866 over to the CE.

Customers with 3866s not covered by IBM Maintenance Agreement may have the unit(s) repaired (if the unit is repairable) for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement Coverage, he may have the machine(s) inspected.

If, on the basis of the inspection, it is concluded that the state of the machine precludes normal maintenance, the machine is returned to the customer without charge subject to a minimum charge for the inspection.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.< )

**RPQs:** (Canada only> RPQs will not be accepted.< ) (Except Canada> RPQs will be accepted immediately. Processing will begin in 90 days. Response time depends upon complexity.< )

### SPECIFY

- (Canada only> Voltage (120V AC, 1-phase, 3-wire, 60 Hz): Specify #9891 for 3.0m (10 ft.) power cable, or #9886 for 1.8m (6 ft.) power cable or #9491 for 0.75m (2.5 ft.) special

rack-installation power cable. If one of the above is not specified, #9891 will be assigned. <)

•

- (Except Canada > Power (AC, 1-phase, 3-wire, 50/60 Hz):

100 - 127V	#2804
200 - 240V	#2806

- Specify #2998. <)

- (Except Canada > Power cable: Specify #9891 for 3.0m (10 ft.) power cable or #9491 for 0.75m (2.5 ft.) special rack-installation power cable. If one of the above is not specified, #9891 will be assigned. <)

- The 3-digit country code is used to select a power cord and plug which meets the requirements of that country.

- Language Group:

English #2924	Japanese #2930
French #2928	Spanish #2931

If one of the above is not specified, the language group will be in English (#2924).

#### SPECIAL FEATURES

**Fan Unit (#3950):** Provides cooling for modem enclosure. The Fan Unit is installed in the rack cabinet above the modem enclosures.

Minimum: One Fan Unit is required for a single 3866 mdl 1 modem enclosure or for a 3866 mdl 2 modem enclosure. Only one Fan Unit is required for two 3866 mdl 1 modem enclosures installed one above the other. Field Installation: Yes. (Except Canada > When ordering this feature for field installation, the specify code for Power must be indicated in the MES order (refer to the "Specify" section). <)

**Power Unit (#5210):** Provides power for the modem packs installed in the modem enclosure. Minimum: One per modem enclosure 3866 mdl 1 or 3866 mdl 2. Field Installation: Yes. (Except Canada > When ordering this feature for field installation, the specify codes for Power and Language must be indicated in the MES order (refer to the "Specify" section). <)

Field Installation: Yes.

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES (NONE)

#### SUPPLIES (NONE)

## 3868 RACK-MOUNTED MODEM

### PURPOSE

The 3868 modem packs are rack-mounted versions of the 3863, 3864 and 3865 modem family to be inserted in a 3866 multi-modem enclosure. Offering in a minimum volume, the maximum density of modems housing facility, they enhance the user capability for easy installation, maintenance and expansion of a user telecommunication network.

### MODELS

**Model 001 (No Longer Available):** 2400 bps modem pack operating in half- or full-duplex data mode over 4-wire, nonswitched duplex telecommunication facility at speeds of 2400/1200 bps. It operates in point-to-point or multipoint mode.

**Model 002 (No Longer Available):** 4800 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 4800/2400 bps. It operates in point-to-point or multipoint mode.

**Model 003:** 9600 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 9600/4800 bps. It operates in point-to-point mode.

**Model 004:** 9600 bps modem pack operating in half- or full-duplex data mode over 4-wire nonswitched duplex telecommunication facility at speeds of 9600/4800 bps. It operates in multipoint mode and can be configured as a multipoint control or as a multipoint tributary station.

**Prerequisites:** A 3866 mdl 1 or 2 with available modem pack slots.

### HIGHLIGHTS

- The 3868 modem packs have the same functional characteristics as the equivalent 3863, 3864 and 3865 stand-alone modems. The following table gives the list of modem packs and equivalent stand-alone modems:

Modem Pack	Description	Equivalent Stand-alone Modem
3868-1	2400 bps leased	3863-1 with extended diagnostic feature
3868-2	4800 bps leased	3864-1 with extended diagnostic feature
3868-3	9600 bps pt-to-pt	3865-1 with extended diagnostic feature
3868-4	9600 bps multipt	3865-2 with extended diagnostic feature

The following list of functions already available with the 3863, 3864 and 3865 stand-alone modems are included in the 3868 mdls 001 to 004 modem packs:

- Data rate:

- 2400 bps with back-up of 1200 bps on mdl 1
- 4800 bps with back-up of 2400 bps on mdl 2
- 9600 bps with back-up of 4800 bps on mdls 3 and 4

- Operation on 4-wire nonswitched duplex communication facility.
- A microprocessor for signal processing.
- Automatic Remote Speed Selection: The transmission speed of the remote modem follows the transmission speed of the local modem (primary status). The network configuration of the remote modem must be secondary.
- Anti-Streaming: A multipoint tributary modem can automatically cut off transmission if a terminal holds "Request to Send" up longer than 40 seconds (an abnormal condition in IBM communication protocol). Customer switch option.
- Automatic and Adaptive Equalization: Equalization is automatically performed by the modem and continues to adapt in data mode.
- Operator Panel with operational status indicators and data quality (Good/Poor) indications.
- The modem diagnostic function referred to as Link Problem Determination Aid (LPDA), operates with Systems Network Architecture (SNA) and associated program products. (Except Canada > (LPDA functions are not supported with V.26bis.) <) Under control of these programs, the modem accepts commands and initiates status retrieval and tests that help isolate problems to the line, local or remote modem, or elsewhere in the network and provide the network operator with the most probable cause of a network problem. These program products are:

Network Communication Control Facility (NCCF) Version 1 Release 2 (PP 5735-XX6).

Network Problem Determination Application (NPDA) Version 2 (PP 5668-983) or Version 3 (PP 5668-920 MVS/370, MVS/VA) (PP 5666-925 DOS/VSE, SSX/VSE).

ACF/NCP Version 1 Release 2.1 or Release 3 (PP 5735-XX1) or ACF/NCP Version 2 (PP 5735-XX9). Receive Signal Level Reporting is not supported by these versions.

- Modem pack provides its own clocking or will accept DTE (external) clocking.
- Fast (RFS) Ready for sending delay available for multipoint tributary modem (customer switch option).

**Note:** If a function is not listed herein, it is not available on the 3868 modem packs.

**Diagnostics:** Built-in diagnostics: All modems will respond to diagnostic commands from the system. Test requests and responses utilize the same data path and controls that are used by the S/370, System/36, S/8100, (DPPX/SP), 4300 processor or 9370 processor for data transmission. Thus, diagnostic status/test requests can be interspersed with data requests without interrupting terminal sessions.

NPDA implemented under the Network Communication Control Facility (NCCF) program product has both summary and detailed level information for determining probable cause of network errors. Probable cause differentiates between errors in the communications controller, line, modem, modem interfaces or terminals.

NPDA will also utilize the new modem facilities to provide alert messages on error threshold and display formatted modem test results and status data including receive signal level.

In addition, tests can also be executed from the modem operator panel. These manual tests include:

- Modem self-test -- this includes an extensive test of modem microcode, plus a data wrap with reduced thresholds for received data.
- Local loop-back test -- provides a "wrap" or loop-back at the line interface to allow terminal wrap tests through the modem.
- Remote loop-back test -- provides a "wrap" or loop-back at the remote modem to allow a DTE wrap test back through the local modem for nonswitched modems. This test does not require remote operator assistance.
- Loop test -- allows an end-to-end test to any modem on the link without remote operator assistance.
- Lamp test -- tests all indicator lights on the operator panel.

**Customer Set Up (CSU):** The 3868 Rack-Mounted modems are designated to be set up by the user thereby offering the customer availability and relocation flexibility.

(Except Canada > In countries where CSU is prohibited or impractical, terms and conditions will include CE support for installation. Contact IBM to find out if CSU applies. <)

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate hardware ordering including Commercial Cabinet, Site preparation and setting up. For more information, refer to the "Planning and Site Preparation Guide", GA33-0023.
- Arrangements for the price quotations, installation, and all costs of common carrier equipment and service.
- Private line (nonswitched) channel -- arranging for the telecommunications service supplier to provide a voice-grade data channel.
- Ensuring the availability of the interconnecting cable between the business machine and the modem because it is not supplied by the modem.
- Receipt at the customer's receiving dock, unpacking and setting up the packs.
- Performing 3868 check-out in accordance with supplied procedures for initial setup and relocation.
- Using customer problem determination procedures provided with the 3866 to determine the failing unit and filling out the appropriate 3868 problem report prior to (Canada only > taking action to get the failing unit repaired or exchanged. <) (Except Canada > requesting maintenance service. <) (See "Maintenance" below.)
- Procuring any required spare packs. The customer may wish to replace a failing 3868 with a spare and must be informed to retain sufficient spare units for such use. The number of spare units recommended is dependent upon the number units the customer has installed, the operational requirements, physical locations, and layouts. However, the minimum number of spare units recommended is shown in the following table:

Number of 3868s Installed	Minimum Number of Spares Recommended
001-100	3
001-200	4
201-300	6
301-500	8
501-1000	14
1001-1500	19
1500-2000	24

- Notifying IBM of intent to relocate the unit, and following IBM instructions for relocation.

- Disconnecting, packing and movement to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be supplied by IBM.
- All three of the following program products must be installed for LPDA to function:

NCCF Version 1 Release 2 (PP 5735-XX6)  
NPDA Version 2 (PP 5668-983) or Version 3 (PP 5668-920, PP5666-925)  
ACF/NCP Version 1 Release 2.1 or Release 3 (PP 5735-XX1) or ACF/NCP Version 2 (PP 5735-XX9)

**(Canada only > Warranty Service:** The warranty period is three years. Warranty Service is provided under the terms and conditions of the Agreement for Purchase of IBM Machines and the Amendment for IBM Service/Exchange Center Services. The service offering during warranty is Customer On-Site Exchange (COE) as described below.

**Customer On-Site Exchange (COE):** It is the customer's responsibility to set up the equipment and to determine when maintenance is required. The customer may wish to replace a failing element with a spare element and should be advised to purchase sufficient spare elements.

It is the customer's responsibility to disconnect the element(s) and call a designated number to have a replacement element(s) delivered to the customer site where they will be exchanged (without testing) for the customer's defective unit(s). The defective elements become the property of IBM.

The 3868 will be eligible for IBM Maintenance Agreement coverage immediately following expiration of the warranty for an annual charge. The maintenance offering will be Customer On-Site Exchange (COE).

**Maintenance:** The level of maintenance service on rental (MRC) machines is Customer On-Site Exchange (COE). Maintenance service is provided under the Amendment for IBM Service/Exchange Center services.

**On-Site Assistance:** If the customer desires assistance to perform Customer Problem Analysis and Resolution (CPAR), he may call for assistance on a toll free number. IBM will respond to the customer site to aid the customer in performing CPAR procedures using the same documentation available to the customer. IBM assistance is billable at the application rates and terms. <)

**(Except Canada > Maintenance:** Maintenance of 3868s is available under IBM Maintenance agreement for on-site maintenance. It is the customer's responsibility to install the equipment and to determine when maintenance is required.

The 3868 modem packs are made for easy insertion and removal in a 3866 Enclosure. This capability will allow for customers to determine if a modem pack is failing and to quickly restore service by the replacement of a questionable modem pack by a spare. Customers wishing to avail themselves of this capability should plan to obtain spare modem packs for this purpose.

Repair of the 3868 modem packs will require the availability of the 3868 link to the CE. If the customer has restored service with the use of a spare modem pack, it will still be necessary for the customer to turn a 3868 link over to the CE for the purposes of problem verification, determination, and repair verification.

On-site maintenance is provided during the warranty period.

Customers with 3868s not covered by IBM Maintenance Agreement may have the unit(s) repaired (if the unit is repairable) for a time and material charge.

If maintenance coverage is not contracted for immediately following the expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he may have the machine(s) inspected.

If, on the basis of the inspection, it is concluded that the state of the machine precludes normal maintenance, the machine is returned to the customer subject to a minimum charge for the inspection.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage. <

interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Bibliography:** See specific systems bibliography.

**RPQs:** (Canada only) >RPQs will not be accepted. <

## COMMUNICATIONS FACILITIES - MDLS 1 AND 2

**PTT Facilities:** Telecommunications lines of a normal quality for data transmission can be used. See IBM for the availability of such facilities in your country.

Privately-owned Communication Facilities: Equivalent to above.

## COMMUNICATIONS FACILITIES - MDLS 3 AND 4

**PTT Facilities:** 3868 Modems mdl 3 and mdl 4 require CCITT M1020 channels. Note: In some countries, lower cost facilities can be used.

On 3868 mdl 4, the short (24 millisecond) Ready for Sending Delay may be used.

Privately-owned Communication Facilities: Equivalent to above.

**Extended Diagnostic Functions:** Provided with 3868 mdls 1 to 4, these functions enhance the diagnostic capabilities of non-switched modems when it is installed in both the local and remote modems. It provides an additional test that enables NPDA to differentiate between modem failure, line failure and remote modem power loss. These functions may not work properly in some countries on a multipoint line of normal quality. A possible solution is to use a CCITT M1020 line.

**Related Equipment:** The 3868 operates with IBM communication products capable of 2400 bps operation for mdl 1, 4800 bps operation for mdl 2 and mdl 2 and 9600 bps operation for mdls 3 and 4. See M2700 pages. The 3868 communicates with another appropriately configured 3868 or 3863/3864/3865 stand-alone modem. The

## SPECIFY

- Telecommunication cable (modem to telecommunications line connection):

7.5m (25 ft) Standard connector terminated #9713 0.7m (2.5 ft) Unterminated (no plug), for custom installation #9719

If one of the above is not specified, #9713 will be assigned.

The 3-digit country code is used to select a telephone cord and plug which meets the requirements of that country.

- Language Groups:

English #2924	Japanese #2930
French #2928	Spanish #2931

If one of the above is not specified, the language group will be in English (#2924).

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## MACHINES

**3872 MODEM**
**PURPOSE**

A 2400 bps modem, with half-speed capability, used to provide communications products with the means for transmitting data over nonswitched lines.

**MODELS**

**Model 1 001**

**Prerequisites:** See "Teleprocessing Systems" in GI Section 3 and the M2700 pages, for facilities description and attached machine configurations. Consult your country TP Coordinator to determine approval status and PTT requirements.

**HIGHLIGHTS**

Modem operation is possible in half-duplex mode over 2- or 4-wire half-duplex facilities, half-duplex or duplex mode over 4-wire duplex facilities, or half-duplex mode over switched telecommunication networks.

**Data Rates:** 2400 bps with backup half-speed.

**Equalization:** Manually adjustable by operator.

**Operation:** Multipoint control, multipoint tributary or point-to-point. See "Special Features".

**Built-In Diagnostics:** Included in each modem are the following diagnostic features accessible to the operator: (1) The modem may be *wrap tested* independently of the using machine and telecommunication channel ... (2) It may be *line tested* with a remote modem and telecommunication channel, independently of the attached business machine. The test may be one-way or remotely wrapped to the local modem.

**Communication Facilities**

**PTT Nonswitched Lines:** Telecommunication lines of a normal quality for data transmission can be used. See your country TP Coordinator for the availability of such facilities. Also see the *IBM 3872 User's Guide*, GA27-3058.

**Privately Owned Communications Facilities:** Equivalent to above.

**International Facilities:** Request your country TP Coordinator to contact the coordinator in other countries involved to determine the availability of the required telecommunication lines.

**Attachment to Facilities:** Attachment to telecommunication lines is by means of a cable provided with the 3872.

**Related Equipment:** The 3872 operates with IBM communications products capable of 2400 bps operation ... see "Related Equipment" under "Specify". Modem clocking must be used. The 3872 Modem must communicate with another appropriately equipped 3872, or with an appropriately equipped IBM 2400 bps Integrated Modem. The interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Customer Responsibilities:** The customer must be informed of his responsibilities as detailed in the M2700 pages and in the Installation Planning section of the *3872 User's Guide*, GA27-3058. The customer is responsible for:

1. Arrangements for price quotations, installation and all costs of common carrier equipment and services.
2. Furnishing adequate telecommunication lines in accordance with the communication facilities noted above and with proper operating levels and characteristics. Refer to "Customer Responsibilities" in the M2700 pages and in the Installation Planning section of the *3872 User's Guide*, GA27-3058.
3. Providing voice communication between modems to coordinate tests or re-equalization. The voice facility can be provided by the 3872 Alternate Voice feature. Information concerning the handset for the Alternate Voice feature is described in the *3872 Modem User's Guide*. The voice facility must be located such that an operator can use it while operating the controls on the front of the modem.
4. If the 3872 is to be attached to a non-IBM product, the interconnecting cable between the business machine and the modem must be supplied by the business machine.

**Publications:** GA27-3089 ... *IBM Speed Modem Digest*, GA27-3059 ... *IBM 3872 User's Guide*, GA27-3058

**SPECIFY**

- Power (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	115V #9901
200V #2806	200V #2732
220V #2813	208V #9902
235V #2814	230V #9904

- Language Groups: #2927 for English, #2928 for French, #2929 for German.

- Power Cord: #2710 for World Trade Standard; #2711 for UK type; #2906 for 60 Hz or, for Japan, 50 Hz.

- Telecommunication Cord (modem to telecommunication facility): Specify one of the following for each telecommunication channel or network connection:

#2775 - cable for single modem or for first modem in a double unit; #2943 for NTT D1 line with PD1A, Japan. #2776 - cable for second modem in a double unit; #2944 for NTT D1 line with PD1A, Japan. Do not specify #2776 or #2944 for a single modem.

A 10-foot cable will be supplied. If a longer cable is required, indicate 15, 20 or 25 feet as the quantity of the feature number specified.

- Related Equipment: For record purposes, one 3872 Attachment Feature Code from the table below must be specified for each 3872, depending upon the unit to which it is attached.

The Following Table Has Been Revised:

Machine	3872 Attach #	Machine	3872 Attach #
2701	#9505	4952	#9573
3115	#9527	4953	#9573
3125	#9525	4954	#9573
3135	#9512	4955	#9573
3135-3	#9525	4987	#9574
3138	#9550	5010	#9531
3232-1	#9585	5110	#9564
3271	#9513	5231	#9547
3274	#9558	5251	#9565
3275	#9514	5265	#9566
3276	#9557	5285	#9604
3601	#9532	5288	#9605
3602	#9532	5320	#9545
3614	#9532	5340	#9559
3624	#9578	5381	#9570
3631	#9560	5404	#9549
3632	#9561	5406	#9518
3651	#9534	5408	#9538
3684	#9572	5410	#9519
(Canada only+)		5412	#9546
3694	#9581 +)	5415	#9533
3704	#9516	5525	#9606
3705	#9515	6240	#9562
3707	#9548	6640	#9556
3725	#9515	6670	#9563
3735	#9517	8101	#9569
3741	#9526	8130	#9567
3747	#9526	8140	#9568
3767	#9537	6/420	#9575
3771	#9540	6/430	#9552
3774	#9542	6/440	#9553
3775	#9543	6/442	#9576
3776	#9544	6/450	#9554
3777	#9528	6/452	#9577
3780	#9521	MC II	#9555
3791	#9535	RPO	#9524
3845	#9579	Non-IBM	#9520
3846	#9579		

**SPECIAL FEATURES**

The basic 3872 Modem, with no additional features required, is used at the control station in a centralized multipoint network. **Specify:** Telecommunication Cord #2775 or #2943 (for Japan). Additional capabilities/configurations are provided by the following features:

**Alternate Voice (#1051, #1052):** Provides signalling capability and a socket on the operator panel into which a customer-provided handset may be plugged, permitting voice communications with the distant 3872 Modem(s). Data cannot be simultaneously transmitted with

**MACHINES**

**3872 Modem (cont'd)**

voice. A handset is not provided. See *3872 User's Guide* for description of handset. #1051 -- for basic modem ... #1052 -- for Second Modem (#6302). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #1052 requires #6302.

**Direct Line Attachment (#2939, #2940):** Available in some countries to meet PTT specifications to have the 3872 homologated. Consult your TP Coordinator to determine if it is required. #2939 -- for basic modem ... #2940 -- for second modem (#6302). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #6302 for #2940.

**Fan-Out (#3901):** This feature allows attachment, to the 3872, of up to three IBM Teleprocessing machines at one location ... see "Related Equipment" under "Specify" for applicable machines. Only one of the attached machines may transmit at a time. This feature may be used at a tributary station in a centralized multipoint network. In this configuration, multipoint programming discipline will provide the selection/control of the specified IBM terminals without any additional user involvement. This feature may also be used to allow up to three of the specified IBM multiplexers, communications controllers, integrated communications adapters or communications adapters on 4331, at a central site, to share the same 3872 Modem for backup purposes. In this case, although all of the machines attached to the 3872 will receive the incoming data simultaneously, the user switchover procedure must ensure that only one machine is sending. **Limitations:** Cannot be installed with Second Modem (#6302) or . **Maximum:** One. **Field Installation:** Yes.

**Multipoint Tributary (#5101, #5102):** Used on each modem attached to tributary stations in a centralized multipoint network to compensate for line distortion between the control and tributary station. Operator adjustment on front panel. #5101 -- for basic modem ... #5102 -- for Second Modem (#6302). **Limitations:** #5101 cannot be installed with Point-to-Point (#6101) ... #5102 cannot be installed with Point-to-Point (#6102). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #5102 requires #6302.

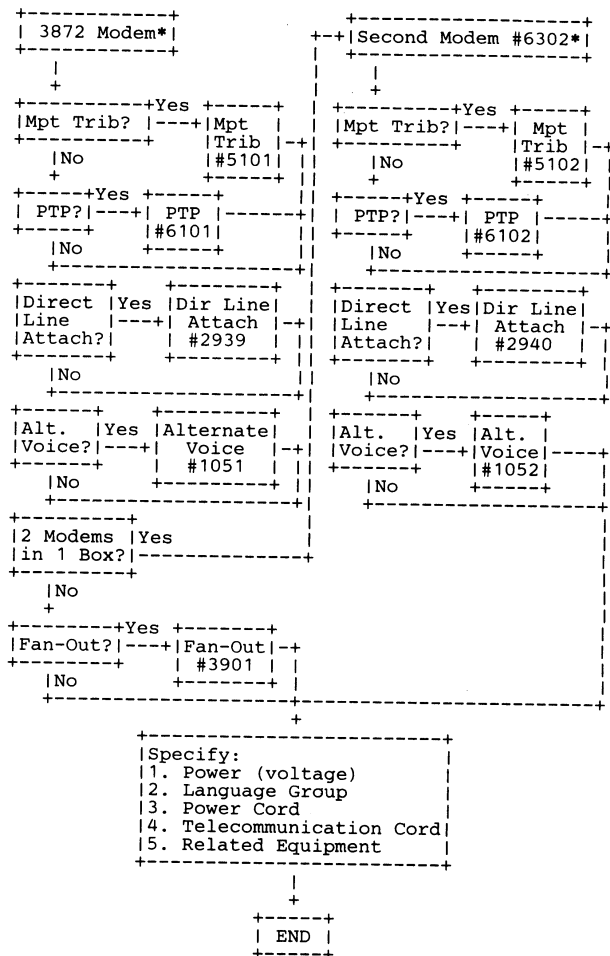
**Point-to-Point (#6101, #6102):** Used on modems at each end of a point-to-point private line (nonswitched) channel to compensate for line distortion. #6101 -- for basic modem ... #6102 -- for Second Modem (#6302). **Limitations:** #6101 cannot be installed with Multipoint Tributary (#5101) ... #6102 cannot be installed with Multipoint Tributary (#5102). **Maximum:** One of each. **Field Installation:** Yes. **Prerequisites:** #6102 requires #6302.

**Second Modem (#6302):** Permits two modems, each to operate on a separate line, to be housed in the same stand-alone cabinet. The two modems share the same power supply. **Limitations:** Only the following features are allowed on either or both modems -- Alternate Voice (#1051, #1052), Direct Line Attachment (#2939, #2940), Point-to-Point (#6101, #6102), Multipoint Tributary (#5101, #5102). **Maximum:** One. **Field Installation:** One. **Specify:** Telecommunication Cord #2776 or #2944 (for Japan).

**CONFIGURATOR**

The HONE Configurator, CFMODEM, is available for assistance in configuring the 3872 Modem. The following Configurator Diagram should be used in locations where the HONE Configurator is not available.

**Feature Code Configuration Flowchart**



\* Multipoint Control Modem

**TERMS and CONDITIONS**

Plan Offering: Plan B  
Purchase Option: 50%  
Machine Group: B  
Warranty: B

Per Call: 2  
Educational Allowance: No  
Pre-Installation Test Allowance:  
None

**MODEL CONVERSIONS (None)**

**ACCESSORIES (None)**

**SUPPLIES (None)**

## 3880 STORAGE CONTROL MODELS 1, 2, 3

THERE IS MORE THAN ONE TEXT VERSION FOR THIS PRODUCT

### PURPOSE

Provides two independent control unit paths, called storage directors, for 3330/3333, 3340/3344, 3350, 3370, 3375 and 3380 direct access storage.

### MODELS

**Model 1 001:** Each of the two storage directors provides for attachment of either up to four 3340 model A2s, or up to four 3370 model A1s and/or A2s in any combination, or up to four 3375 model A1s and/or D1s, or up to four 3333s (any model) and 3350 A2/A2Fs and C2/C2Fs in any combination (see DASD Attachment Configuration under "Specify" and M3330, 3333, 3340, 3344, 3350, 3370, and 3375 pages).

**Model 2 002 (No Longer Available):** One of the two storage directors provides for DASD attachment as described for both storage directors of the model 1 above. The other storage director provides for attachment of either up to two 3380 model A4s or two 3380 model AA4s (see M3380 pages).

**Model 3 003:** Each of the two storage directors provides for attachment of up to two 3380 model A4s or up to two 3380 model AA4s or AD4s or AE4s or any combination of AA4s, AD4s or AE4s limited to two, or with feature #3005 any combination of AD4, AE4, AJ4, or AK4 limited to two. (See M3380 pages).

### Limitations:

1. See M3330, 3333, 3340, 3344, 3350, 3370, 3375, 3380 pages for system support limitations.
2. 3350 DASD attached to the 3880 must be in Native Mode format; 3330 models 1 and 11 Compatibility Mode are NOT supported.
3. In S/370 Model 135, 135-3, 138, when a 3880 is attached to a block multiplexer channel, only 16 logical devices will operate in this mode, even if more than 16 logical devices are attached.
4. Models of 3380 DASD with dynamic path selection (models AA4, AD4 and AE4) may not be attached to the same storage director as models of 3380 without dynamic path selection (model A4).
5. On a 4361 or 4381 Processor, a 3.0Mb/sec. block multiplexer channel must be used to attach 3380 DASD on a 3880 model 2 or 3 storage director, even if that storage director has the Speed Matching Buffer for 3380 feature #6550 installed.

**Maximum Configuration:** For configurations attaching 3340/3344 DASD, the storage director uses 64 contiguous addresses irrespective of the number of drives attached. The 3340 model A2s on the first and third strings may attach up to three 3340 model B1s/B2s and/or 3344s in any combination. The 3340 model A2 on the second string may attach up to three 3340 model B1s/B2s. The 3340 model A2 in the fourth string may attach one 3340 model B1/B2.

For a storage director attaching 3370 DASD, a maximum of four 3370 models A1 and A2 in any combination, each with up to three 3370 model B1s or B2s in any combination may be attached.

For a storage director attaching 3330/3333/3350 DASD, a maximum of four 3333 model 1s, 3333 model 11s, and/or 3350 models A2s/A2Fs in any combination. Each string with a 3333 model 1 or 11 may attach up to three 3330 models 1s/2s or 11s. Each string with a 3350 model A2/A2F may attach up to three 3350 models B2s/B2Fs or up to two 3350 models B2s/B2Fs and a 3350 model C2/C2F.

For a storage director attaching 3380 DASD, a maximum of two A4s or two AA4s, or two AD4s, or two AE4s, or a maximum of two in combination of AA4, AD4 or AE4, or with feature #3005 a maximum of two in any combination of AD4, AE4, AJ4, or AK4. Each string with a 3380 model A4/ AA4 may attach up to three 3380 model B4s. Each string with a 3380 model AD4 may attach up to three 3380 model BD4s or BE4s in any combination. Each String with a 3380 model AE4 may attach up to three 3380 model BD4s or BE4s in any combination. Each String with a 3380 model AJ4 may attach up to three 3380 model BJ4s or BK4s in any combination. Each String with a 3380 model AK4 may attach up to three 3380 model BJ4s or BK4s in any combination.

For a storage director attaching 3375 DASD, a maximum of four 3375 model A1s and/or D1s.

**Prerequisites:** An available control unit position for each storage director on a block multiplexer channel. One unshared subchannel for each logical address attached to a block multiplexer channel.

3880 models 2 and/or 3 storage directors attaching 3380 model A4/ AA4 DASD must be attached to either a 3.0Mb/sec. block multiplexer channel which can operate in data streaming mode or must have the Speed Matching Buffer for 3380 feature (#6550). 3880 model 3 storage directors attaching 3380 models AD4 or AE4 DASD must be attached to a 3.0Mb/sec. block multiplexer channel which can operate in data streaming mode. 3380 models AD4, AE4, AJ4 and AK4 cannot be attached to 3880 model 3 storage directors with a Speed Matching Buffer for 3380 feature (#6550). On 3880 models 1 and/or 2, storage directors attaching 3375 DASD must be attached to either a block multiplexer channel which can operate at 1.859Mb/sec. or more or must have the Speed Matching Buffer for 3375 feature (#6550). Attachment of either the 3380 without use of the Speed Matching Buffer for 3380 feature or the 3375 without use of the Speed Matching Buffer for 3375 feature, through the 3880 to 3031, 3032, 3033 or 3042 model 2 requires the Data Streaming feature (#4850) installed on the processor. Attaches to a 3081, 3083, or 3084 Processor via any block multiplexer channel.

When 3380 models AD4 or AE4 are attached to a 3880 model 3, the 3880 model 3 requires the presence of a 3380 AD4/AE4 Support feature (#8173) and two 3380 Extended specify codes (#9208).

When 3380 models AJ4 or AK4 are attached to a 3880 model 3, the 3880 model 3 requires the presence of a 3380 AJ4/AK4 support feature (#3010) and two 3380 enhanced specify codes (#9050).

On a 4361 or 4381 Processor, storage directors on 3880 models 2 or 3 attaching 3380 DASD must be attached to a 3.0Mb/sec. block multiplexer channel. This condition must be met even if the storage director has the Speed Matching Buffer for 3380 feature #6550 installed. The 4361 and 4381 Processors do not support use of feature #6550 at any data rate other than 3.0Mb/sec.

On a 4341 Processor, storage directors on 3880 models 2 or 3 attaching 3380 models A4 or AA4 DASD must either be attached to a 3.0Mb/sec. block multiplexer channel or have the Speed Matching Buffer for 3380 feature (#6550) and be attached to a 2.0 or 3.0Mb/sec. block multiplexer channel. 3880 model 3 storage directors attaching 3380 models AD4 or AE4 DASD must be attached to a 3.0Mb/sec. block multiplexer channel. On a 4381 Processor, storage directors on a 3880 model 2 or 3 attaching 3380 DASD must be attached to a 3.0Mb/sec. block multiplexer channel. Attachment of the 3380 models A4 and AA4 to 4381 processors in shared DASD environments via speed matching buffer (#6550) is supported only on 4381 3.0Mb/sec. channels. Storage directors on 3880 models 1 and 2 attaching 3350, 3370 or 3375 DASD must be attached to a 2.0 or 3.0Mb/sec. block multiplexer channel; storage directors on 3880 models 1 or 2 attaching 3330/3333 or 3340/3344 DASD may be attached to either a 1.0 (Model Group 1), 2.0 or 3.0Mb/sec. block multiplexer channel.

On a 4331 Model Group 2, a 3880 model 1 or 2 is supported only on the optional High-Speed Block Multiplexer Channel (#1431).

On a 4361 model Group 4 or model Group 5, a 3880 model 2 or 3 attaching 3380 DASD is supported only on one of the High-Speed Block Multiplexer Channels (#1431, #1432, #1433).

On a S/370 model 165-II and 168, attachment is to the 2880 Block Multiplexer Channel. On S/370 model 158, 158-3, 168 and 168-3, the S/370 Extended feature (#7730) is required in order to attach 3380 or 3375 through a 3880 model 2 or 3 when the programming support used is one of the MVS/System Program Products.

On the 9370, attachment is to the S/370 Block Multiplexer Channel (#6003). 3880 models 1 and 2 are supported by 9375 and 9377 processors only.

## HIGHLIGHTS

File organization and format are under program control, allowing random or sequential processing of files. Two independent storage directors allow orderly conversion to newer 3370, 3375 or 3380 DAS. Multiple requesting allows multiple overlapped operations on DAS drives attached to each storage director. Data Integrity is provided through extensive error detection and correction capabilities. Advanced logic and improved fault detection capability provide high availability. The 3880 Model 3 now can attach the newly announced 3380 Enhanced Subsystem Models AJ4, AK4, BJ4, and BK4.

**System Attachments:** Each storage director attaches to a processor channel. The second of the two storage directors can attach to either the same channel as the first, or a different channel on the same processor, or a channel on a different processor. The following DASD and processor attachments are supported:

Processor(s)	DASD
4341/4361/4381	3330, 3333, 3340, 3344, 3350, 3370, 3375, 3380
4331 Mdl Group 2	3330, 3333, 3340, 3344, 3350, 3370, 3375
S/370 mdls 135, 135-3, 138, 145, 145-3, 148, 155-II, 165-II, 3330, 3333, 3344, 3340, 3350, 3375	3330, 3333, 3340, 3344, 3350
S/370 mdls 158, 158-3, 168, 168-3	3330, 3333, 3340, 3344, 3350, 3375, 3380
3031, 3032, 3033, 3081, 3083, 3084	3330, 3333, 3340, 3344, 3350, 3375, 3380
3090	3330, 3333, 3350, 3375, 3380
9370	3330, 3340, 3344, 3350, 3370, 3375, 3380

**Publications:** GA26-1661

## SPECIFY

- Power (AC, 3-phase):

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
20V #2800	
240V #2801	240V #9915

380V #2816  
400V #2825  
415V #2826

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

- Machine Nomenclature:

Brazilian	German #2929
(Portuguese) #2938	Japanese #2930
English #2927	Spanish #2931
French #2928	

- DASD Attachment Configuration: Two of the following must be specified, one for each storage director. The same attachment may be specified twice on models 1 and 3 only. Model 2 must specify one #9193 or #9194, and one #9190, #9191, #9192, #9195 or #9198.

Attachment	Specify	Appl- cable Models
3330/3333/3350	#9192	1 or 2
3340/3344	#9190	1 or 2
3370	#9191	1 or 2
3380 w/o #6550	#9193	2 or 3
3380 with #6550	#9194	2 or 3
		w/o #9208
3375 w/o #6560	#9195	1 or 2
3375 with #6560	#9198	1 or 2
3380 Extended w #8173	#9208	3 only
3380 Enh. Subsystem		
DASD Attach.	#9050	3 only

## Notes:

- Diskette-only specify feature. There is a fee for purchased machines when DASD Attachment Configuration features are changed via MES. This fee is not charged when feature code #8173 is first installed.
- On MES orders where one of the two DASD Attachment Configuration specify codes is changed, you must also specify removal and addition of the other code, even though the code does not change. This will assure that the latest EC level of code is shipped for both storage directors.

## SPECIAL FEATURES

**3380 AJ4/AK4 Support (#3005):** This feature allows the attachment of 3380 Models AJ4 and AK4 to the 3880 Model 003. The 3380 Models AJ4 and AK4 must have feature #9431. This feature also supports 3380 Models AD4 and AE4. This feature does not allow the attachment of 3380 Models A04 and AA4. This feature cannot be installed on machines with the Speed Matching Buffer (#6550) special feature unless it is removed. If an installed machine has the 3380 AD4/AE4 Support (#8173) special feature, it must be removed. If the attached DASD is to be cross connected to another 3880 Model 3, then both Model 3s must have #3005 installed.

**Limitations:** Special feature #3005 cannot be installed on 3880 Model 3s with serial numbers between 9700000 and 9709999, between X0101 and X0199, between Y0101 and Y0199, and between Z0101 and Z0199 unless RPQ 3880 Extended Feature Enable (MM2865) is also installed. Model 3s with RPQs Airline Buffer RPQ MM2741, Limited Lock w/ #8173, RPQ 8B0050, Limited Lock w/o #8173, RPQ 8S0026, Airline Buffer RPQ 8S0027, and Command Retry Modification - 3880 RPQ 8S0093 are incompatible with feature #3005. If an installed 3880 Model 3 has AD4/AE4 Support (#8173) or Speed Matching Buffer (#6550) special features installed, they must be removed. To cross connect 3380 Models AJ4 or AK4 to two IBM 3880

Storage Controls, each storage control must have matching features #3005. Maximum: One. Prerequisite: Two #9050s

(No Longer Available for Model 2)

**Remote Switch Attachment (#6148):** Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each storage director, or two channel connections to each storage director (using #8170). Maximum: One. Field Installation: Yes.

**Remote Switch Attachment, Add'l (#6149):** Removes the four additional enable/disable switches provided by the Two-Channel Switch Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Maximum: One. Field Installation: Yes. Prerequisites: #8170, #8171, #6148.

**Remote Switching Attachment for Eight-channel Switch (#6150):** Removes the eight additional enable/disable switches provided by the Eight-Channel Switch (#8172) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Maximum: One. Field Installation: Yes. Prerequisites: #8170, #8171, #8172, #6148, #6149.

**Speed Matching Buffer for 3380 (#6550):** Supports attachment of 3380 models A4 and AA4 DASD to 1.5Mb/sec. block multiplexer channels on S/370 models 158, 158-3, 168 and 168-3, 3031, 3032, 3033 and 3042 model 2, and 2.0Mb/sec. block multiplexer channels on the 4341 Processor. Also supports attachment of 3380 A4 and AA4 to 3.0Mb/sec. block multiplexer channels on 3031, 3032, 3033 and 3042 model 2 that have the Data Streaming feature (#4850) with data transfer at 3.0Mb/sec., or a 3.0Mb/sec. block multiplexer channel on a 4341, 4361 or 4381 Processor. The feature is for a storage director that attaches 3380, A4 and AA4. Limitations: On a 3031, 3032, 3033 or 3042 model 2 channel group with Data Streaming (#4850), first three block multiplexer channels of the group can attach 3880 storage directors with this feature installed. When both paths of the 3380 with the dynamic path selection function are attached to a single processor, both storage directors must have the Speed Matching Buffer feature or neither may have it.

On 3031, 3032, 3033 or 3042 model 2 channel group without Data Streaming, first two block multiplexer channels of the group can attach 3880 storage directors with this feature installed. See "IBM 3031, 3032, 3033 Processor Complex Channel Configuration Guidelines", GC22-9020, for more information.

On a S/370 model 158 or 158-3, the first two block multiplexer channels can attach 3880 storage directors with this feature installed. See "Guide to the System/370 Model 158", GC20-1754, for more information.

On a S/370 model 168 or 168-3, six block multiplexer channels can attach 3880 storage directors with this feature installed. See "System/370 Model 168 Functional Characteristics", GA22-7010, for more information. Maximum: One on a 3880 model 2; two on a 3880 model 3. Field Installation: RPQ MM2865 is required as a prerequisite for field installation on machines with serial numbers 10445 through 20000. Field installable via MES on machines with serial numbers 20200 through 29999, 30200 through 39999 and 40200 through 99999. Not available for any other machines. Prerequisites: #9194 -- 3380 with #6550.

**Speed Matching Buffer for 3375 (#6560):** Supports attachment of 3375 DASD to 1.5Mb/sec. block multiplexer channels on S/370 Models 145, 148, 155-II, 158, 158-3, 165-II, 168, 168-3, 3031, 3032, 3033, and 3042 Model 2 Processors. Also supports attachment of 3375 to 3.0Mb/sec. block multiplexer channels on 3031, 3032, 3033 and 3042 Model 2 that have the Data Streaming Feature (#4850) with data transfer at 3.0Mb/sec., or a 2.0 or 3.0Mb/sec. block multiplexer channel on a 4341 or 4381 Processor, or the 3.0Mb/sec. block multiplexer channel on the 3081 Processor, or the optional High-Speed Channel on the 4331 Model Group 2. If channels of speeds different from 1.859 megabytes per second are switched to a storage director with Speed Matching Buffer Feature, the 3.0 and 2.0Mb/sec. block multiplexer channels are supported at the 3375 data rate (1.859Mb/sec.) and the 1.5Mb/sec. block multiplexer

channels are supported at the channel data rate (1.5Mb/sec.). The feature is for a storage director that attaches 3375. Limitations: On a 3031, 3032, 3033 or 3042 model 2 channel group with Data Streaming (#4850), first three block multiplexer channels of the group can attach 3880 storage directors with this feature installed.

On 3031, 3032, 3033 or 3042 Model 2 channel group without Data Streaming, the first two block multiplexer channels of the group can attach 3880 storage directors with this feature installed.

On a S/370 Model 155-II, the first or second block multiplexer channel can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 158 or 158-3, the first two block multiplexer channels can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 165-II, four block multiplexer channels can attach 3880 Storage Directors with this feature installed. On a S/370 Model 168, 168-3, six block multiplexer channels can attach 3880 Storage Directors with this feature installed.

On a S/370 Model 145 or 148, the first block multiplexer, only, can attach 3880 Storage Directors with this feature installed. Word Buffer Feature (#8810) is required on S/370 Model 145. Maximum: Two on a 3880 model 1; one on a 3880 model 2. Field Installation: Field installable on 3880 Model 1 or 2 machines with serial numbers 97-50001 and above. RPQ MM2865 is required as a prerequisite for machines with serial number 97-0001 through 97-00607. Not available for any other machines.

**Two-Channel Switch Pair (#8170):** To attach each storage director to a second channel. Four unique channels may be switched, two to each storage director or the same two channels may be switched to both storage directors. The channels to be switched may be on the same or on different processors. An available control unit position is required on each channel-- see "Prerequisites". Switching is under program control. Each storage director can be dedicated to a single channel by means of an enable/disable switch. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair, Add'l (#8171):** Adds switching for two additional channels per storage director on a 3880 with the Two-Channel Switch Pair (#8170) feature, providing four channel switch capability for both storage directors. Up to eight unique channels may be switched, four to each storage director. Each storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. Maximum: One. Field Installation: Yes. Prerequisites: #8170.

**Eight-Channel Switch (#8172):** For 3330/3333/3350 and/or 3380 DASD, adds switching for four additional channels per storage director on a 3880 with the Two-Channel Switch Pair and Two-Channel Switch Pair, Add'l features (#8170, #8171), providing eight channel switch capability for both storage directors. The same eight channels must be switched to both storage directors. Each storage director can be dedicated to a subset of the eight attached channels by means of an enable/disable switch. Maximum: One. Field Installation: Available at time of manufacture only. Prerequisites: #8170, #8171. Only supported for 3330/3333/3350 (#9192) and/or 3380 (#9193, #9194, #9208).

**3380 AD4/AE4 Support (#8173):** This feature is standard on all 3880 model 3s with serial numbers above 97-80000 that do not have Speed Matching Buffer for 3380 feature (#6550). It is required to attach 3380 models AD4 and AE4 DASD to the 3880 model 3. This feature is mutually exclusive with the Speed Matching Buffer for 3380 feature (#6550). To attach 3380 AD4/AE4 Support (#8173) to a 3880 model 3, it is necessary to remove the Speed Matching Buffer(s) first. Feature #8173 incorporates that removal where it is required. (Some parts are re-used in the process.) The 3380 AD4/AE4 Support feature can be installed on 3880 model 3s with serial numbers 97-50001 to 97-59999, 97-70000 to 97-79999. The feature cannot be installed on 3880 model 3s with serial numbers between 97-00000 and 97-09999, or 97-60000 and 97-69999. One feature provides both storage directors with 3380 AD4 and AE4 DASD attachment capability. Unless a Speed Matching Buffer for 3380 feature is ordered, all orders for 3880 model 3s must include one 3380 AD4/AE4 Support feature (#8173), and two 3380 Extended specify codes (#9208). Limitation: 3380 AD4/AE4 Support feature (#8173) cannot be installed on a 3880 model 3 with a Speed Matching Buffer

for 3880 feature (#6550) or on 3880 model 3s with serial numbers between 97-00000 and 97-09999, or 97-60000 and 97-69999. Prerequisite: Two 3380 Extended specify code #9208s.

When placing an MES order to enable 3880 model 3 to attach 3380 models AD4 and AE4 DASD, the following procedures apply:

- If there is no Speed Matching Buffer for 3380 feature, the MES Order should show:
  - Add: One (1) #8173 3380 AD4/AE4 Support feature, and two (2) #9208 3380 Extended specify codes.
  - Delete: Two (2) #9193 3380 w/o #6550 specify codes.
- If there is one Speed Matching Buffer for 3380 feature (and the customer does not wish to retain the complete SMB parts,) the MES Order should show:
  - Add: One (1) #8173 3380 AD4/AE4 Support feature, and two (2) #9208 3380 Extended specify codes.
  - Delete: One (1) #6550 Speed Matching Buffer for 3380, one (1) #9193 3380 w/o #6550 specify codes, and one (1) #9194 3380 with #6550 specify code.
- If there are two Speed Matching Buffers for 3380 features (and the customer does not wish to retain the complete SMB parts), the MES Order should show:
  - Add: One (1) #8173 3380 AD4/AE4 Support feature, and two (2) #9208 3380 Extended specify codes.
  - Delete: Two (2) #6550 Speed Matching Buffer for 3380, and two (2) #9194 3380 with #6550 specify codes.

**Note:** All 3880 model 3s starting with serial number 97-80000 except those with Speed Matching Buffer for 3380 feature (#6550), will be

equipped with 3380 Extended specify codes (#9208). Whenever 3380 model AA4s are attached to a storage director of 3880 model 3 with a #9208 specify code and also to a prior 3880 model 3 with #9193 specify code, it is necessary for the #9193 specify code to be at EC level 461461 or higher.

## MODEL CONVERSIONS

Model upgrades are field installable. MES orders for model upgrades must include removal of old DASD Attachment Configuration specify codes and addition of new specify codes. When models 1 or 2 are upgraded to a model 3, they will attach 3380 models A4, AA4 and B4, but not models AD4/BD4, AE4/BE4, AJ4/BJ4, or AK4/BK4. 3380 AD4/AE4 Support feature (#8173) and two 3380 Extended specify codes (#9208) must be ordered by MES to support attachment of 3380 models AD4/BD4 and/or models AE4/BE4.

**Note:** See feature #8173 description for serial number restrictions before ordering.

3380 AJ4/AK4 support feature (#3005) and two 3380 enhanced specify codes (#9050) must be ordered by MES to support attachment of 3380 models AJ4/BJ4 and/or models AK4/BK4.

**Note:** See feature #3005 description for serial number restrictions before ordering.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3880 STORAGE CONTROL MODEL 4

### PURPOSE

Provides a single control unit path, called a Storage Director, for 3370 and 3375 Direct Access Storage. The model 4 contains one Storage Director that provides for attachment of up to four 3370 models A1 and A2 in any combination, or up to four 3375 model A1s. See DASD Attachment Configuration under "Specify" and M3370 and 3375 pages.

### MODEL 4

#### Model 4 004

#### Limitations:

1. See M3370 and 3375 pages for system limitations.
2. 3370s and 3375s cannot both be attached to the storage director at the same time.

**Maximum:** A maximum of four 3370 models A1 and A2 in any combination, or four 3375 model A1s can be attached -- see M3370 and 3375 pages.

**Prerequisites:** An available control unit position on a block multiplexer channel for the storage director. One unshared sub-channel is required for each logical address attached to a block multiplexer channel.

On the 4331-2 or 4361, the Storage Director must be attached to a High-Speed Block Multiplexer Channel (#143X).

On the 4341, the Storage Director must be attached to a 2.0Mb/sec. Block Multiplexer Channel.

On the 4381, the Storage Director must be attached to either a 3.0Mb/sec. Block Multiplexer channel or to a 2.0Mb/sec. Block Multiplexer Channel.

On the 9370, the Storage Director must be attached to the Block Multiplexer Channel (#6003). Supported by 9375 and 9377 processors only.

### HIGHLIGHTS

File organization and format are under program control, allowing random or sequential processing of files; data integrity is provided through extensive error detection and correction capabilities; advanced logic and improved fault detection capability provide high availability.

**Systems Attachment:** The single storage director attaches to a processor channel. The following DASD and processor attachment is supported:

Processor	DASD
4331-2	3370, 3375
4341	3370, 3375
4361	3370, 3375
4381	3370, 3375
9370	3370, 3375

### Bibliography: GC20-0001

### SPECIFY

#### Power (AC, 3-phase):

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
240V #2801	240V #9915
380V #2816	
400V #2825	
415V #2826	

#### Machine Nomenclature:

Brazil	German #2929
(Portuguese) #2938	Japanese #2930
English #2927	Spanish #2931
French #2928	

#### DASD Attachment Configuration: Only one of the following may be specified:

#### Attachment Specify

3370	#9201
3375	#9202

Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES.

#### Color: #9060 for willow green #9061 for garnet rose, 9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, or #9065 for pebble gray.

### SPECIAL FEATURES

**Two-Channel Switch (#8160):** To attach the storage director to a second channel. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel; see "Prerequisites" above. Switching is under program control. The storage director can be dedicated to a single channel by means of an enable/disable switch. Maximum: One. Field Installation: Yes.

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3880 STORAGE CONTROL MODEL 11

(NO LONGER AVAILABLE)

### PURPOSE

The 3880 Storage Control model 11 modifies the first Storage Director, called the Paging Storage Director, to manage dynamically an 8Mb solid-state storage unit, for page and swap data. The storage unit is divided into a directory and a cache. Up to eight actuators of 3350 disk storage provide backing storage for the cache. The second Storage Director operates in a conventional manner, as a 3880 Model 1 Storage Director, for 3330/3333 and 3350 direct access storage only.

### MODEL 11

**Model 11 D11:** Provides 8,388,608 bytes of Subsystem Storage.

**Prerequisites:** An available control unit position on a block multiplexer channel for each Storage Director. Four unshared subchannels are required for each 3350 device attached to the Paging Storage Director. One unshared subchannel is required for each 3350 or 3333/3330 device attached to the other Storage Director. The channel must be able to provide either a 1.5 or 3.0Mb/sec. capability.

Attaches to a 3081 or 3083, 3084, or 3090 Processor Unit via a block multiplexer channel.

Attaches to a 303X or 3042 Attached Processor model 2 via either a 1.5 or 3.0Mb/sec. channel. In order to operate at 3.0Mb/sec., the Data Streaming Feature (#4850) is required.

On a S/370 model 168 or 168-3, attachment is to a 2880 Block Multiplexer Channel capable of 1.5Mb/sec.

On a S/370 model 158 or 158-3, attachment is to any block multiplexer channel capable of 1.5Mb/sec.

On a 4341 and 4381, Storage Directors attaching 3350 DASD must be attached to a 2.0 or 3.0 Mb/sec. block multiplexer channel. Data rate will be up to 1.5 or 3.0 Mb/sec. respectively for the Paging Storage Director. See M4341 and 4381 pages for information.

**Maximum:** The Paging Storage Director is limited to attaching one 3350 model A2/A2F and three model B2/B2Fs, or one 3350 model A2/A2F, two model B2/B2Fs and one C2/C2F. The other Storage Director attaches 3330/3333/3350 DASD: a maximum of four 3333 model 1s, 3333 model 11s, and/or 3350 model A2s/A2Fs in any combination. Each string with a 3333 model 1 or 11 may attach up to three 3330 model 1/2s or 11s. Each string with a 3350 model A2/A2F may attach up to three 3350 model B2/B2Fs or up to two 3350 model B2/B2Fs and a 3350 model C2/C2F.

### Limitations:

1. The 3350 model A2/A2F or C2/C2F attached to the Paging Storage Director may not be actively string switched to another Storage Director (i.e., String Switch special feature (#8150) on the 3350 is not supported). The switch may be installed but it is recommended that the switch should be manually positioned to the Paging Storage Director.
2. See M3330, 3333, 3350 for system support limitations.
3. 3350 DASD attached to either 3880 model 11 Storage Director must be in native mode format; 3330 models 1 and 11 Compatibility Mode are not supported.
4. All 3880 model 11 conversions require a 3880 model 1 as the converted-from machine.

US manufactured 60 Hz machines: Eligible 3880 machines that can be field model converted are 3880 models with serial

numbers between 20200 and 29999, 30200 and 39999, and 40200 and 99999.

US manufactured 50 Hz machines: Eligible 3880 machines that can be field model converted are 3880 models with serial numbers between X0201 and X9999, Y0201 and Y9999, and Z0201 and Z9999.

Non-US manufactured 50 Hz machines: Eligible 3880 machines that can be field model converted are 3880 models with serial numbers between 9750004 and 9759999.

5. While the Paging Storage Director may be attached to more than one host system for backup reasons, true dynamic sharing of the paging devices is not supported.
6. The 3880 special feature Eight-Channel Switch (#8172) is not supported.

### HIGHLIGHTS

- Access to page and swap data in the cache at electronic speeds and transfer at channel speeds of up to 1.5 or 3.0Mb/sec. Up to 3.0Mb/sec. data rates are provided on data streaming channels only.
- Attaches to 1.5, 2.0 or 3.0Mb/sec. channels (Data rate on a 2.0Mb/sec. channel is up to 1.5Mb/sec.).
- Multiple exposures for 3350s attached to the Paging Storage Director in a similar manner to that provided by the 2305 Fixed Head Storage.
- Easy migration.
- Dynamically managed cache.
- Subsystem Storage size of 8MB.
- The 3880 model 11 will attach to a 1.5, 2.0 or 3.0Mb/sec. block multiplexer channel on S/370 models 158 or 168, 303X, 3042 Attached Processor model 2, 4341, 4381, 3081, 3083, 3084 or 3090 Processor. On a 303X or 3042 Attached Processor model 2, the Data Streaming Feature (#4850) is required for operation in data streaming mode at 3.0Mb/sec.
- MVS/SP Release 3 and MVS DFDS Support.
- VM/SP High-Performance Option Release 3 Support.

**System Attachments:** Each Storage Director attaches to a processor block multiplexer channel whose speed may be 1.5, 2.0 or 3.0Mb/sec. (Data rate on a 2.0Mb/sec. channel is up to 1.5Mb/sec.) The second of the two Storage Directors can attach to either the same channel as the first, or a different channel on the same processor, or a channel of a different processor. These channels need not be the same speed. Only the following DASD and Processor attachments are supported (note the Paging Storage Director attaches to 3350 devices only):

Processor(s)	DASD
4341 Mdl Grps 1,2	3330, 3333, 3350
4381	3330, 3333, 3350
S/370 mdls 158,158-3, 168,168-3,3131,3032, 3033,3042 mdl 2,3081, 3083,3084,3090	3330, 3333, 3350

**Publications:** GC20-0001

## MACHINES

### SPECIFY

- Power (AC, 3-phase):
 

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	
- Machine Nomenclature:
 

Brazilian	German	#2929
(Portuguese) #2938	Japanese	#2930
English	Spanish	#2931
French		#2928
- DASD Attachment Configuration: Specify one each of the following; one for each Storage Director:
 

Attachment	Specify
3330/3333/3350	#9192 *
3350/Paging	#9196 *

\* Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES. Note: The specify features must be changed when field model conversions of 3880 model 1 to model 11 occur. See "Model Conversions".
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble grey.

### SPECIAL FEATURES

**Remote Switch Attachment (#6148):** Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel connection to each Storage Director, or two channel connections to each Storage Director when using the Two-Channel Switch Pair (#8170). Maximum: One. Field Installation: Yes.

**Remote Switch Attachment, Add'l (#8149):** Removes the four additional enable/disable switches provided by the Two-Channel Switch Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Prerequisites: #8170, #8171 and #6148. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair (#8170):** To attach each Storage Director to a second channel. Four unique channels may be switched, two to each Storage Director or the same two channels may be switched to both Storage Directors. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each Storage Director can be dedicated to a single channel by means of an enable/disable switch. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair, Add'l (#8171):** Adds switching for two additional channels per Storage Director on a 3880 equipped with a Two-channel Switch Pair (#8170), providing four-channel switch capability for both Storage Directors. Up to eight unique channels may be switched, four to each Storage Director. Each Storage Director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. Maximum: One. Prerequisites: #8170. Field Installation: Yes.

### MODEL CONVERSIONS (NO LONGER AVAILABLE)

MES orders for field model conversion of the 3880 model 1 to model 11 must include removal of both the old DASD Attachment Configuration specify codes from the 3880 model 1 and the addition of the new specify codes #9196 and #9192 for the model 11. All 3880 model 11 field model conversions require a 3880 model 1 as the converted from machine. Field installation on purchased machines involves removal of parts that become the property of IBM. Note machine serial number restrictions outlined in point 4 of the Limitations section.

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3880 STORAGE CONTROL MODEL 13

(NO LONGER AVAILABLE)

### PURPOSE

Provides two independent control unit paths, called cache storage directors, for 3380 Direct Access Storage devices. Each cache storage director shares access to an electronic storage unit, called subsystem storage, to two cache storage directors, to the subsystem storage and attached 3380 DASD forming a caching subsystem. The two cache storage directors and subsystem storage are contained in a single caching subsystem. For improved data availability, two 3880s may be attached in a Dual Frame Configuration. In this configuration, one cache storage director from each frame is part of each subsystem. The cache retains frequently used application data for fast access by the host, and the directory contains entries to locate data in the cache.

### MODEL 13

**Model B13:** 4,194,304 bytes of Subsystem Storage.

**Model D13:** 8,388,608 bytes of Subsystem Storage.

**Prerequisites:** An available control unit position on a 3.0Mb/sec. data streaming channel for each cache storage director. One unshared subchannel is required for each logical address attached to a block multiplexer channel. Dynamic Path Selection (3880 model AA4) is required for attached DASD.

Attaches to a 3081, 3083, 3084 or 3090 Processor Unit via any block multiplexer channel.

Attachment to a 3031, 3032, 3033 or 3042 Attached Processor model 2 requires data streaming (#4850) on the processor's channel group.

4341 models manufactured before March, 1981, require an engineering change to achieve data streaming on their 3.0Mb/sec. channels.

**Maximum:** A 3880 model 13 may attach one or two 3380 model AA4s. Each string with a 3380 model AA4 may attach up to three 3380 model B4s. Each 3380 AA4 must be attached to both cache storage directors on the same caching system.

### Limitations:

- See M3880 pages for system support limitations.
- In a single frame configuration, 3380 units that are attached to a 3880 model 13 cache storage director must also attach to the other cache storage director in the same 3880 model 13. In a Dual Frame Configuration, each 3380 must attach to a cache storage director in each frame. The two cache storage directors that share the 3380's must also share a subsystem storage.
- Speed Matching Buffer for 3380 (#6550) cannot be installed.
- A single channel cannot attach to both cache storage directors in a caching subsystem.
- (US manufactured 60 Hz machines) All 3880 models with serial numbers between 20200 and 29999, 30200 and 39999, and 40200 and 99999 can be field model converted to model 13s after conversion to 3880 model 3.

(US manufactured 50 Hz machines) All 3880 models with serial numbers between X0201 and X9999, Y0201 and Y9999, and Z0201 and Z9999 can be field model converted to model 13s after conversion to 3880 model 3s.

(Non-US manufactured 50 Hz machines) All 3880 models with serial numbers between 975004 through 975999 can be field model converted to model 13s after conversion to 3880 model 3.

### HIGHLIGHTS

Provides fast access to disk application data records in the cache storage. Helps reduce the effect of DASD skew. Cache contents are dynamically managed by a modified Lease Recently Used (LRU) algorithm. Requires no more floor space than other 3880 models. Data integrity is provided through extensive error detection and correction capabilities and the architecture of the cache implementation.

**Systems Attachments:** Each cache storage director attaches to a 3.0Mb/sec. data streaming channel. The second of the two cache storage directors can attach to a different channel on the same processor, or a channel on a different processor. The following Processor attachments are supported:

Processor(s)	DASD
3081, 3083, 3084, 3090, 3033, 3032, 3031, and 3042 mdl 2	3380
4341, 4381	3380

**Publications:** GC20-0001

### SPECIFY

- Power (AC, 3-phase):

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

- Machine Nomenclature:

Brazilian (Portuguese) #2938	German #2929
English #2927	Japanese #2930
French #2928	Spanish #2931

- DASD Attachment Configuration: Specify two #9197s \*; one for each cache storage director.

\* Diskette-only specify feature. No fee when ordered at time of manufacture. A fee on purchased machines when attachment specify features are changed via MES. Note: The specify feature for each storage director must be changed when field model converting 3880 models to the model 13. See point 5 under "Limitations" section for field model conversion information.

- Color: #9060 for willow green, #9061 for garnet rose #9062 for sunrise yellow, #9063 for classic blue #9064 for charcoal brown, #9065 for pebble gray.

### SPECIAL FEATURES

**Remote Switch Attachment (#6148):** Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the single channel

connection to each cache storage director, or two channel connections to each cache storage director when using the Two-Channel Switch Pair (#8170). Maximum: One. Field Installation: Yes.

**Remote Switch Attachment, Add'l (#6149):** Removes the four additional enable/disable switches provided by the Two-Channel Switch Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Maximum: One. Prerequisites: #8170, #8171, #6148. Field Installation: Yes.

**Remote Switch Attachment For Eight-Channel Switch (#6150):** Removes the eight additional enable/disable switches provided by the Eight-Channel Switch (#8172) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Maximum: One. Prerequisites: #8170, #8171, #6148, #6149, #8172. Field Installation: Yes.

**Two-Channel Switch Pair (#8170):** To attach each cache storage director to a second channel. Four unique channels may be switched, two to each cache storage director. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each cache storage director can be dedicated to a single channel by means of an enable/disable switch. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair, Add'l (#8171):** Adds switching for two additional channels per cache storage director on a 3880 equipped with a Two-Channel Switch Pair (#8170), providing four-channel switch capability for both cache storage directors. Up to eight unique channels may be switched. Each cache storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. Maximum: One. Prerequisites: #8170. Field Installation: Yes.

**Eight-Channel Switch (#8172):** The Eight-Channel Switch Feature allows up to eight host systems to access either storage director in a 3880 storage control. The same eight channels must attach to both storage directors in that storage control. The Eight-Channel Switch Feature then combines with the Dual Frame Configuration option to allow up to 16 attaching channels to access each attached DASD. Note: The Eight-Channel Switch Feature can be fully utilized only in the Dual Frame Configuration (see Limitation Item 4). Maximum: One. Prerequisites: #8170, #8171. Field Installation: No.

#### MODEL CONVERSIONS (NO LONGER AVAILABLE)

Field installable. MES orders for field model conversions must include removal of both old DASD Attachment Configuration specify codes and the addition of the new specify code (#9197) for each cache storage director on the model 13. All 3880 model 13 field model conversions assume a 3880 model 3 as the converted from machine. Note the machine serial number restrictions outlined in point 6 of the "Limitations" section. See M3880 pages for information about field model converting 3880 models 1 and 2 to a 3880 model 3.

Parts removed or replaced when upgrading from other 3880 models to a 3880 model 13 become the property of IBM.

#### ACCESSORIES (NONE)

#### SUPPLIES (NONE)

## 3880 STORAGE CONTROL MODEL 21

### PURPOSE

The 3880 Storage Control model 21 modifies both storage directors to manage dynamically a 16, 32, 48, or 64Mb solid-state storage unit, for page and swap data. The storage unit is divided into a directory and a cache. Up to two strings of 3350 disk storage provide backing storage for the cache.

### MODEL 21

**Model E21 E21:** Provides 16Mb of Subsystem Storage.

**Model G21 G21:** Provides 32Mb of Subsystem Storage.

**Model H21 H21:** Provides 48Mb of Subsystem Storage.

**Model J21 J21:** Provides 64Mb of Subsystem Storage.

**Prerequisites:** The two-channel switch feature is required. An available control unit position on a block multiplexer channel for each storage director. Four unshared subchannels are required for each 3350 device attached to the 3880 model 21. The channel must be able to provide either a 1.5 or 3.0Mb/sec. capability. With feature #6140, the model 21 can attach to 3090 4.5Mb/sec. channels.

**Maximum:** The 3880 model 21 is limited to attaching up to two 3350 model A2/A2Fs. A 3350 model A2/A2F may attach up to one model B2/B2F or one C2/C2F. All models A2, A2F, C2, and C2F attached must have the special feature String Switch (#8150).

### Limitations:

1. See M3350 pages for system support limitations.
2. 3350 DASD attached to either 3880 model 21 storage director must be in native mode format; 3330 models 1 and 11 Compatibility Mode are not supported.
3. While a storage director may be attached to more than one host system for backup reasons, true dynamic sharing of the paging devices is not supported.
4. The 3880 special feature Eight-Channel Switch (#8172) is not supported.
5. Only 3880 models 1 and 11 may be field model converted to a model 21; this MES is purchase-only and can only be applied to purchased models 1 and 11. If the converted-from machine is a 3880 model 1, then only machines with the following serial numbers may be converted:
  - US manufactured 60 Hz machines: 20200 to 29999.
  - US manufactured 50 Hz machines: X0201 to X9999.

Non-US manufactured 50 Hz machines: 97-50001 to 97-59999; 97-70001 and above.

**Note:** The 3880 model 21 requires the Two-Channel Switch feature #8170; this must be added if the converted machine lacks this feature.

Parts removed or replaced when field model converting a machine become the property of IBM.

### HIGHLIGHTS

- Follow-on product to the 3880 model 11 and upgradable from it.
- Subsystem Storage sizes of 16, 32, 48, and 64Mb using 256K bit Dynamic Random Access Memory technology.

- Improved transfer path allowing concurrent operations between cache and channel and DASD and cache.
- Access to page and swap data in the cache at electronic speeds and transfer at channel speeds of up to 1.5 or 3.0Mb/sec. Up to 3.0Mb/sec. data rates are provided on data streaming channels only.
- Attaches to 1.5, 2.0 or 3.0Mb/sec. channels (data rate on a 2.0Mb/sec. channel is up to 1.5Mb/sec.).
- Multiple exposures for 3350s attached to the 3880 model 21 in a similar manner to that provided by the 3880 model 11.
- Easy migration.
- Dynamically managed cache.
- MVS/370 support.
- MVS/XA support.
- For VM - VM/SP High Performance Option Release 3.4 or VM/XA Migration Aid Release 2.0 as a dedicated device.
- On 3880 Model 21, feature #6140 allows cache-to-host transfers at speeds up to 4.5Mb/sec. on 3090 4.5Mb/sec. channels.

**System Attachments:** Each storage director attaches to a processor block multiplexer channel whose speed may be 1.5, 2.0 or 3.0Mb/sec. (Data rate on a 2.0Mb/sec. channel is up to 1.5Mb/sec.) The second of the two storage directors would normally be attached to a different channel on the same processor complex. These channels need not be the same speed. Only the following processor attachments are supported:

- 4341 and 4381
- 3031, 3032, 3033, 3042 model 2, 3081, 3083, 3084, 3090
- 9375, 9377

Attaches to a 3090 Processor Unit via a block multiplexer channel. If feature #6140 is installed, the Model 21 can operate at rates up to 4.5Mb/sec. on 4.5Mb/sec. channels.

Attaches to a 308X Processor Unit via a block multiplexer channel.

Attaches to a 303X or 3042 Attached Processor model 2 via either a 1.5 or 3.0Mb/sec. block multiplex channel. In order to operate at 3.0Mb/sec. the Data Streaming Feature (#4850) is required. On a 4341 or 4381, storage directors attaching 3350 DASD must be attached to a 2.0 or 3.0Mb/sec. block multiplexer channel. Data rate will be up to 1.5 or 3.0Mb/sec., respectively, for the storage directors. See M4341 and 4381 pages for more information.

On a 9370 Processor, attachment is supported in environment 1 only. See M9370 pages for more information.

**Bibliography:** GC20-0001

### SPECIFY

- Power (AC, 3-phase):
 

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
20V #2800	
240V #2801	240V #9915
380V #2816	
400V #2825	
415V #2826	

- Machine Nomenclature:

Brazilian

German #2929

(Portuguese) #2938 Japanese #2930  
English #2927 Spanish #2931  
French #2928

- DASD Attachment Configuration: Specify two #9206s \*; one for each Storage Director:

\* Diskette-only specify feature. No fee when ordered at time of manufacture or field model conversion. Note: Attachment specify codes must be changed when field model conversions of 3880 model 1 or 11 to model 21 occur. See "Model Conversions".

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

## SPECIAL FEATURES

**4.5Mb/Sec. Support (#6140):** Support for cache-to-host transfers on 4.5Mb/sec. channels on 3090 Processors for 3880 Storage Control Models D21, E21, G21, H21, and J21. Limitations: 3880 Model 21 with feature #6140 4.5Mb/sec. support must use Cable Group 0185 on 4.5Mb/sec. channels. They must follow all 3990 Storage Controls on those channels and must precede all other storage controls. Maximum: One. Prerequisite: Cable Group 0185 on 4.5Mb/sec. channels.

**Remote Switch Attachment (#6148):** Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of up to four switches, accommodating the two channel connections to each storage director when using the Two-Channel Switch Pair (#8170). Maximum: One. Field Installation: Yes.

**Remote Switch Attachment, Add'l (#6149):** Removes the four additional enable/disable switches provided by the Two-Channel Switch Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Prerequisites: #8170, #8171 and #6148. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair (#8170):** (Required) To attach each storage director to a second channel. Four unique channels may be

switched, two to each storage director or the same two channels may be switched to both storage directors. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each storage director can be dedicated to a single channel by means of an enable/disable switch. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair, Add'l (#8171):** Adds switching for two additional channels per storage director on a 3880 equipped with a Two-Channel Switch Pair (#8170), providing four-channel switch capability for both storage directors. Up to eight unique channels may be switched, four to each storage director. Each storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. Maximum: One. Prerequisites: #8170. Field Installation: Yes.

## MODEL CONVERSIONS

All 3880 model 21 field model conversions require a purchased 3880 model 1 or 11 as the converted from machine. MES orders for field model conversion of the 3880 model 1 and 11 to model 21 must include removal of both the old DASD Attachment Configuration specify codes from the 3880 model 1 or 11 and the addition of two new specify codes #9206, one on each director of the 3880 model 21. Note that the 3880 model 21 requires the Two-Channel Switch feature #8170. This must be added if the converted machine lacks this feature. A 3880 model 21 model can be field upgraded to a larger cache memory size model. A purchased memory upgrade may be applied only to a purchased 3880 model 21; a rental (MRC) memory upgrade may be applied only to a rental (MRC) 3880 model 21. Field installation on purchased machines involves removal of parts that become the property of IBM. Note machine serial number restrictions outlined in point 5 of "Limitations".

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3880 STORAGE CONTROL MODEL 23

### PURPOSE

The 3880 model 23 and the attached 3380 DASD form a high performance cache/DASD subsystem for application data. Cache memory of 8, 16, 32, 48, or 64Mb includes a cache and a directory. The cache retains frequently used application data for fast access by the host, and the directory contains entries to locate data in the cache. Cache contents are dynamically managed by a modified least recently used (LRU) algorithm. The intent is to keep the high-activity data in the cache to provide data access without the mechanical delays of DASD.

The 3880 model 23 provides two independent control unit paths, called Cache Storage Directors, for 3380 models AA4/B04, AD4/BD4, AE4/BE4, AJ4/BJ4, and/or AK4/BK4 direct access storage devices. Note that attaching AJ4 or AK4 requires feature #3010 (with this feature 3380 Models AA4 and A04 are not supported). Each Cache Storage Director shares access to an electronic storage unit, called Subsystem Storage, and to the attached 3380 models AA4/B04, AD4/BD4, AE4/BE4, AJ4/BJ4, and/or AK4/BK4 direct access storage devices, forming a single caching subsystem called a single frame configuration. For improved data availability, two 3880s may be attached in a dual frame configuration. The dual frame configuration allows alternate path access to all attached DASD even if one of the two model 23s is unavailable. In this configuration, each string must attach to a cache storage director in each control unit. The two storage directors that have common 3380s also share the same subsystem storage.

### MODEL 23

**Model D23 D23:** 8Mb of Subsystem Storage.

**Model E23 E23:** 16Mb of Subsystem Storage.

**Model G23 G23:** 32Mb of Subsystem Storage.

**Model H23 H23:** 48Mb of Subsystem Storage.

**Model J23 J23:** 64Mb of Subsystem Storage.

**Prerequisites:** An available control unit position on a 3.0Mb/sec. or 4.5Mb/sec. block multiplexer channel for each Cache Storage Director. One unshared subchannel is required for each logical address.

Two-Channel Switch (#8170) is required.

Attaches to a 3090, 3084, 3083, 3081, 3042 model 2, 3033, 3032, 3031, 4343, 4381, 9375, and 9377 processor unit via 3.0Mb/sec. block multiplexer channel. With feature #6140, the model 23 can attach to 3090 4.5Mb/sec. channels. 3031, 3032, 3033, and 3042 model 2 require the data streaming feature.

4341 models manufactured before March, 1981, require an engineering change to achieve data streaming on their 3.0Mb/sec. channels.

**Maximum:** A 3880 model 23 may attach one or two 3380 model AA4s, AD4s, AE4s, AJ4s, or AK4s. A 3380 string is comprised of one model AXX and from zero to three model BXX. Further, two 3380 model AXX can be attached to one 3880 storage director, allowing up to eight 3380 units per storage director. (See items 2 and 3 in "Limitations" section for attachment restrictions).

### Limitations:

- See M3380 for system support limitations.
- In a single frame configuration, DASD strings that are attached to a 3880 model 23 Cache Storage Director must also attach to the other Cache Storage Director in the same 3880 model 23. In a dual frame configuration, each DASD string must attach

to a Cache Storage Director in each frame. The two Cache Storage Directors that share the DASD strings must also share a subsystem storage.

- Models BD4 and BE4 can be intermixed within strings headed by either a model AD4 or model AE4. Models BO4 can attach only to strings headed by model AA4. Strings headed by models AA4, AD4, and AE4 can be paired in any combination on any two storage directors within a 3880 model 23 configuration.
- Models BJ4 and BK4 can be intermixed within strings headed by either a model AJ4 or model AK4. Strings headed by models AD4, AE4, AJ4, or AK4 can be paired in any combination on any two storage directors within a 3880 model 23 configuration. Feature #3010 is mandatory to attach AJ4 or AK4.
- Speed Matching Buffer for 3380 (#6550) cannot be installed.

**Note:** A 3880 model 3 with one or two speed matching buffers (SMB) can be converted to a 3880 model 23. This conversion removes the SMB(s) and does not require a separate MES for the removal. However, if the machine is purchased and the customer wants to retain the SMB parts, an RPQ to remove the SMB should be ordered and installed prior to the conversion of the model 23.

- A single channel cannot attach to both Cache Storage Directors in a caching subsystem.
- The Eight-Channel Switch is fully utilized for frames attached in a Dual Frame Configuration.
- 3880 machines that can be field model converted to an 3880 model 23 are only purchased 3880 model 1, 2, 3, 11, 13, or 21s.

US manufactured 60 Hz machines: All 3880 model 1s, 2s, 3s, 11s, 13s, or 21s with serial numbers between 20200 and 29999, 30200 and 39999, and 40200 and 99999 can be field converted to model 23s.

US manufactured 50 Hz machines: All 3880 model 1s, 2s, 3s, 11s, or 13s with serial numbers between X0201 and X9999, Y0201 and Y9999, and Z0201 and Z9999 can be field model converted to model 23s.

Non-US manufactured 50 Hz machines: All 3880 model 1s, 2s, 3s, 11s, 13s, or 21s with serial numbers between 975004 and 975999 can be field converted to model 23s.

Parts removed or replaced when field model converting a machine become the property of IBM.

### HIGHLIGHTS

Provides fast access to disk application data records in the cache storage. As the workload and the DASD activity change, cache contents are dynamically managed by a modified least recently used (LRU) algorithm to keep high activity data in the cache. This prevents a subset of the DASD actuators from becoming a bottleneck. Requires no more floor space than other 3880 models. Data integrity is provided through extensive error detection and correction capabilities and the architecture of the cache implementation. The latest copy of data in the cache is the same as the copy on DASD. The 3880 Model 23 can now attach the newly announced 3380 Enhanced Subsystem Models AJ4, AK4, BJ4, and BK4. On 3880 Model 23, feature #6140 allows cache-to-host transfers at speeds up to 4.5Mb/sec. on 3090 4.5Mb/sec. channels.

**System Attachments:** Each cache storage director attaches to a 3.0Mb/sec. data streaming channel. The second of the two cache storage directors can attach to a different channel on the same processor, or a channel on a different processor. The following processor attachments are supported: 3090, 3084, 3083, 3081, 3042 model 2, 3033, 3032 3031, 4381, 4341, 9375, and 9377.

The 3031, 3032, 3033, and 3042 model 2 require data streaming feature (#4850). 4341 models manufactured before March, 1981, require an engineering change to achieve data streaming on their 3.0Mb/sec. channels.

**Bibliography:** GC20-0001

## SPECIFY

- **Power (AC, 3-phase):**

50 Hz 5-wire	60 Hz 4-wire
200V #2807	200V #2733
220V #2815	208V #9903
240V #2801	240V #9915
380V #2816	
400V #2825	
415V #2826	
- **Machine Nomenclature:**

Brazilian (Portuguese) #2938	German #2929
Japanese #2930	English #2927
Spanish #2931	French #2928
- **DASD Attachment Configuration:** Specify two #9207s \*, one for each storage director.
 

\* Diskette-only specify feature. No fee when ordered at time of manufacture or with model change. Note: The specify feature for each storage director must be #9207 or changed to #9207 when field model converting 3880 models to the model 23. See point 7 under "Limitations" section for field model conversion information.
- **#9055 3880 Model 23 DASD Configuration:** This specify is required for feature code #3010 and must be ordered twice. If this is a MES order for feature #3010, remove specify #9207 twice.
- **Color:** #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

## SPECIAL FEATURES

- **3380 AJ4/AK4 Support (#3010):** This feature allows the attachment of 3380 Models AJ4 and AK4 to the 3880 Models D23, E23, G23, H23, and J23. The 3380 Models AJ4 and AK4 must have feature #9431. It also supports 3380 Models AD4 and AE4. This feature does not allow the attachment of 3380 Models A04 and AA4. If the attached DASD is to be cross connected to another IBM 3880 Model 23 then both Model 23s must have #3010 installed. Limitations: Model 23 Special Feature #3010 is incompatible with the Record Cache RPQ 8B0035. To cross connect 3380 Models AJ4 or AK4 to two IBM 3880 Storage Controls, each storage control must have matching features #3010. Maximum: One. Prerequisite: Two #9055s.
- **4.5Mb/Sec. Support (#6140):** Support for cache-to-host transfers on 4.5Mb/sec. channels on 3090 Processors for 3880 Storage Control Models D23, E23, G23, H23, and J23. Limitations: 3880 Models 23 with feature #6140 4.5Mb/sec. support must use Cable Group 0185 on 4.5Mb/sec. channels. They must follow all 3990 Storage Controls on those channels and must precede all other storage controls. Model 23 Special Feature #6140 is incompatible with the Record Cache RPQ 8B0035. Maximum: One. Prerequisite: Cable Group 0185 on 4.5Mb/sec. channels.

**Remote Switch Attachment (#6148):** Removes the enable/disable switches from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. This feature allows relocation of two channel connections to each cache storage director when using the Two-Channel Switch Pair (#8170). Maximum: One. Field Installation: Yes.

**Remote Switch Attachment, Add'l (#6149):** Removes the four additional enable/disable switches provided by the Two-Channel Switch Pair, Add'l (#8171) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Prerequisites: #8170, #8171 and #6148. Maximum: One. Field Installation: Yes.

**Remote Switch Attachment for Eight-Channel Switch (#6150):** Removes the eight additional enable/disable switches provided by the Eight-Channel Switch (#8172) from the 3880 operator panel and allows them to be relocated to a remote configuration control panel. Prerequisites: #8170, #8171, #8172, #6148, #6149. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair (#8170):** (Required) To attach each cache storage director to a second channel. Four unique channels may be switched, two to each cache storage director. The channels to be switched may be on the same or different processors. An available control unit position is required on each channel (see "Prerequisites" above). Switching is under program control. Each cache storage director can be dedicated to a single channel by means of an enable/disable switch. Maximum: One. Field Installation: Yes.

**Two-Channel Switch Pair, Add'l (#8171):** Adds switching for two additional channels per cache storage director on a 3880 equipped with a Two-Channel Switch Pair (#8170), providing four-channel switch capability for both cache storage directors. Up to eight unique channels may be switched. Each cache storage director can be dedicated to a subset of the four attached channels by means of an enable/disable switch. Prerequisites: #8170. Maximum: One. Field Installation: Yes.

**Eight-Channel Switch (#8172):** The Eight-Channel Switch feature allows up to eight host systems to access either storage director in a 3880 storage control. The same eight channels must attach to both storage directors in that storage control. The Eight-Channel Switch feature then combines with the Dual Frame Configuration option to allow up to 16 attaching channels to access each attached DASD. Note: The Eight-Channel Switch feature can be fully utilized only in the Dual Frame Configuration (see "Limitations", Item 6). Prerequisites: #8170, #8171. Maximum: One. Field Installation: No.

## MODEL CONVERSIONS

Field installable. If the old DASD Attachment Configuration specify code is other than #9207, MES orders for field model conversions must include both the removal of old DASD Attachment Configuration specify codes and the addition of two new specify codes #9207, one for each cache storage director on the model 23. All 3880 model 23 field model conversions assume a purchased 3880 model 1, 2, 3, 11, 13 or 21 as the converted-from machine. Note the machine serial number restrictions outlined in point 7 of "Limitations".

Parts removed or replaced when upgrading or converting from other 3880 models to a 3880 model 23 become the property of IBM.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 3890 DOCUMENT PROCESSOR

### PURPOSE

Reads magnetically inscribed data from card and paper documents into any virtual storage S/370 (except 3115 and 3125) or to a 3090 processor or 4300 processor via the byte multiplexer or block multiplexer channel. Can be used offline for document sorting.

### MODELS

**Models A1, A2, A3, A4, A5, A6:** 13,312 bytes of storage (10,240 bytes if image processing) for stacker select programs and initialization data.

#### Model            Stackers

A1	A01	6
A2	A02	12
A3	A03	18
A4	A04	24
A5	A05	30
A6	A06	36

**Models E2, E3, E4, E5, E6:** 13,312 bytes of storage (10,240 bytes if image processing) for stacker select programs and initialization data.

#### Model            Stackers

E2	E02	12
E3	E03	18
E4	E04	24
E5	E05	30
E6	E06	36

### HIGHLIGHTS

The 3890 is a buffered, modular, pocket reader-sorter which is time-independent. The 3890 mdl A is available with 6 to 36 stackers in increments of 6. The 3890 mdl E is available with a minimum of 12 stackers expandable to 36 in increments of 6. Also, the 3890 mdl E includes as standard: Microfilming and System/370, 30XX, and 4300 Attachment. These features are optional on the 3890 mdl A.

Documents are read at a minimum rate of 2,400 6-inch documents per minute for the 3890 mdls A1 through A6. The 3890 mdls E3 through E6 read at a minimum of 1680 6-inch documents per minute. Actual throughput depends upon length of document. The formula for determining the approximate average rated throughput per minute is: The percentage of non-card stock checks x (19,200/(average document length, which is 6 in. or greater plus 2 in.)) + the percentage of card stock checks x 1,907. For the 3890 mdl E the results of this calculation should be multiplied by 0.7. The primary component of the 3890 is the feed module, which contains the input hopper, recognition circuits, logic to determine stacker selection, merge feed, options when installed, and operator setup and run panels.

**Input Hopper, 3890 Mdl A:** Holds approximately 4,800 documents and permits convenient, continuous loading. A jogger is built into the hopper to eliminate jogging as a separate operation.

**Input Hopper, 3890 Mdl E:** Holds approximately 3,800 documents and permits convenient, continuous loading. Do not include a built-in jogger. Jogging must be performed as a separate operation. About 2,200 additional documents, previously joggered, may be placed in a separate staging area adjacent to the input hopper.

**Merge Feed:** Permits the merging of documents into the normal input stream from a separate hopper. Document capacity is 600.

Document merging is controlled by the user program. For example, as part of job initialization, the user can specify the approximate number of documents to be stacked in each pocket before a document is fed from the merge hopper to that pocket. The 3890 maintains a document count for each pocket. The merge function eliminates the need for programmed pocket lights. Limitations: Does not permit the 3890 to function as a collator.

**Logic and Control Section:** Is initialized by the processor when on-line and by a removable disk when offline. Initialization determines the fields to be read, length of the fields, starting number for the item numbering feature, merge feed controls, whether image processing is to be performed, the stacker control instruction algorithm to be used, endorser requirements, and whether the symbol error correction option is to be used. With the symbol error correction option, the 3890 performs extensive logical analysis to determine whether unreadable symbols can be replaced by internally generated field-defining symbols. The 3890 performs all stacker select determinations independent of processor control and transfers blocked data records to the processor. Due to the logical capability, the following functions are standard "programmable": split field, self-check number verification, multiple column control, base number conversion for fine sorting.

**Stackers:** Each pocket holds approximately 800 to 1,000 documents. The operator can unload all but the last 200-300 documents without stopping the 3890. Pocket warning lights alert the operator when a specific pocket is becoming full. The reject stacker is the first stacker -- the stacker closest to the input hopper. Racks for output trays are above each stacker.

**Documents:** CMC7 (coded magnetic characters with seven bars) characters and print quality must meet the specifications recommended by ECMA (European Computer Manufacturers Association) or ISO (International Standards Organization). E13B magnetic characters, print quality, and codeline arrangement on the documents must meet the specifications recommended by the American Bankers Association or the Committee of London Clearing Bankers. Intermixed paper and card documents within the following specifications can be processed.

- Length: 123 to 223mm (4.85 to 8.75 in.).
- Width: 70 to 106mm (2.75 to 4.17 in.).
- Thickness: 0.064 to 0.178mm (0.0025 to 0.007 in.). Carrier documents containing mutilated documents with a total thickness up to 0.356mm (0.014 in.) will also be transported.
- Basis Weights: 60 to 165 grams per square meter, 16 to 44 pounds (basis weight is the weight of 500 sheets of 17" x 22" paper)
- Grain: grain long or grain short, except for 16 pound paper, which must be grain long.

**Publications:** "IBM 3890 Document Processor, General Information Manual", GA24-3602.

### SPECIFY

- (Canada only > Power (AC, 3-phase, 4-wire, 60 Hz): #9903 for 208V, #9905 for 230V; must be consistent with system voltage.<)
- (Except Canada > Power (AC, 3-phase, 4-wire):
 

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
235V #2818	230V #9905
380V #2816	
408V #2819<)	

- Color: #9041 for red, #9042 for yellow #9043 for blue, #9046 for white.
- Upending Kit #9840, if required.
- Note: Loan basis; remains property of IBM.
- Cabling: #9181 for on the floor.
- Recognition: #2742 for E13B; #2741 for CMC7.
- Machine Nomenclature:

English #2927	Italian #2932
French #2928	Spanish #2931

- SS2 Transmission Option: #9666. Codeline SS2s are not treated as field-defining symbols. Before specifying, refer to: "IBM 3890 Document Processor, Machine and Programming Description Manual", GA24-3612. "IBM 3890 Document Processor Mdl E Machine and Programming Description Manual", GC31-0507. Field Installation: Yes.
- Tool Kits: Required for CE maintenance. For Rental Customer: Specify on first 3890 order for a customer. If required for a multiple machine installation, additional Tool Kits are available via a no-charge MES. For Purchase Customers: Specify on each 3890 machine order. When installed rental 3890s are purchased, a Tool Kit is to be ordered on a no-charge MES for each machine. Specify: #9766 for base machine, #9767 for Microfilming (#5111), #9769 for Item Numbering (#4551), 9770 for Endorsing (#3651).

**Note:** For mdl E and F purchased machines only, Microfilming (#9767), Item Numbering (#9769), and Endorsing (#9770) are shipped automatically.

## SPECIAL FEATURES

**Endorsing (#3651):** Provides the capability of printing a full endorsement on the back of each document. During run initialization, the user specifies whether endorsing is active, and one of three horizontal print positions. Vertical location of endorsement is specified by the customer and is normally set at the plant. The design of the endorser facilitates operator changing of endorser legends for users who have a requirement to print different endorsements. The date portion of the endorser is set by the operator. Specify: #9167 for endorsement at top or #9168 for center. Color of endorser ink to be used: #9145 for black, #9147 for purple. Field Installation: Yes.

**Item Numbering (#4551):** Provides the capability of printing an eight-digit number on the back of each document. The starting item number and one of three locations is determined by the user program at initialization. The number can be incremented on any document cycle based on the user-provided Stacker Control Instructions parameters for the run. The number can be configured by the user at installation to be a combination of batch and serial numbers, or serial number only. Vertical location of the item num-

ber is specified by the customer and is normally set at the plant. Specify: #9379 for item number at bottom or #9378 for center. Field Installation: Yes.

**Microfilming (#5111):** Standard on mdl E. Optional feature on 3890 mdl A. Provides the capability of microfilming items, either front and back (duplex) or front only (duo), being processed on the 3890. Items are selectively filmed under program control at 3890 document speeds. An 8-digit number can be exposed on the film for every other document image filmed. The 8 digit positions can be split into two number fields, which can be incremented or reset on any document cycle under stacker control instruction parameters for the run. During run initialization, the user specifies whether microfilming is active, the mode of filming, and the starting 8-digit number. A frame mark is recorded on film for each document image for image counting during retrieval. The camera provides a reduction ratio of 50 to 1 and a resolution of 120 lines per millimeter. The film is advanced by a capstan drive system based upon the document width to maximize the use of film. The film cassette, a purchase-only item (see "Accessories"), provides space for take-up of the film as well as the film supply. Capacity of the cassette is 2,000 feet of .0027" polyester thin base film. Loading and unloading of film from the cassette into the film transport are automatic under operator control. Approximately 380,000 front and back images of an average intermix of documents can be recorded on 2,000 feet of film. The film is spaced six in. every 215 feet to facilitate splicing; if a 49-inch space is required, specify #9177. The film to be used is 16mm unperforated thin base microfilm which must be ordered on cores. Disclosure specifications covering the film, cassette, and core on which the film must be wound, are available from: Manager, Industry Relations. Field Installation: Yes.

**S/370 and 4300 Attachment (#6370):** Standard on 3890 mdl E. Optional feature on 3890 mdls A. Permits attachment to any virtual storage S/370 processor (except 3115 and 3125) or a 4300 processor via the byte multiplexer or block multiplexer channel. This feature is required on each 3890 attached to a S/370 or a 4300 processor. Maximum: One per 3890. Field Installation: Yes.

## MODEL CONVERSIONS

Field installable.

## ACCESSORIES

**Microfilm Cassette (P/N 2647900):** The film cassette provides space for film take-up as well as supply. Capacity is 2,000 feet of 0.0027-inch polyester thin-base film. The cassette must be loaded in a dark room. Disclosure specifications covering the film, cassette and core on which the film must be wound are available from Manager, Industry Relations, Japan.

## SUPPLIES (NONE)

## 3979 EXPANSION UNIT

### PURPOSE

The 3979 Expansion Unit provides the auxiliary device ports for the attachment of up to three input-output graphic devices to the 3179-G/3192-G. It is attached only to the 3179-G/3192-G Color Graphic Display Station.

### MODELS

**Model 1 001:** The Expansion Unit provides for the attachment of the 5277 Mouse, 3852-2 Color Printer, and the 6180-2, 6184, 7371 or 7372 Color Plotters.

The 3979 attaches to the logic element of the 3179 model G, 3192 model G Color Graphics Display Station.

**Prerequisites:** A 3179-G or 3192-G Color Graphics Display Station is required for attachment of the 5277 Mouse or the 6180-2, 6184, 7371, 7372 Color Plotters via the 3979.

**Note:** Specify IEEE-488 interface #9920 for the 7371 or 7372. Specify IEEE-488 interface #5050 or #5060 for the 6184. Specify plotter attachment cable #5040 for all plotter attachments.

**Customer Setup (CSU):** Yes.

### HIGHLIGHTS

- Provides attachment of graphic input/output devices to the 3179 model G, 3192 model G.
- Low-profile unit with positioning guides for convenient stacking beneath the 3179 model G, 3192 model G logic unit.

**Cables:** A 240mm (9.5 in.) cable is provided to attach the 3979 to a 3179 model G, 3192 model G logic unit.

**Power and Line Cord:** 100-127V AC, 1-phase, 3-wire, 50-60 Hz, or 200-240V AC, 1-phase, 3-wire, 50-60 Hz 2.8m (9.0 ft.) line cord with non-locking plug.

#### Customer Responsibilities:

- Adequate site, system and vendor preparation
- Receipt at customer's receiving dock, unpacking and placement of the unit
- Physical set-up, connection of cables in customer access area, switch settings, and checkout
- Performing Customer Problem Analysis and Resolution (CPAR)

**Warranty:** Three months. Terms and Conditions of the 3979 warranty are different by country. Contact your IBM marketing representative for the warranty applicable in your country.

**Maintenance:** The following maintenance services are available for an annual charge:

IBM On-Site Exchange  
Customer On-Site Exchange  
Customer Carry-In Exchange

Not all service options are available in each country. Contact country Service Department for available service options.

### MACHINE ELEMENTS

Machine elements can be ordered to provide individual elements as needed by the customer in the use of the 3979 Expansion Unit.

**Order Entry:** For shipment, specify Machine Element (P/N) at time of order entry.

Order individual workstation elements through the Telemarketing Representatives.

**Site Planning and Preparation:** The customer should have on hand, or should order the "IBM 3179-G/3192-G Color Graphics Display Station Description", GA18-2261 for site planning and preparation work.

**Warranty:** Three months.

Terms and Conditions of the 3979 Expansion Unit warranty are different by country. Contact your IBM marketing representative for the warranty applicable in your country.

**Maintenance:** Maintenance for an individual element is only available on an hourly service basis at an IBM Repair Center or through an IBM Service/Exchange Center. Hourly service basis at the applicable hourly rates and terms apply. Maintenance for elements is different by country. Contact country Service department for the available maintenance in your country.

Expansion Unit and Line Cord can be ordered as follows:

Machine Element (6 ft.)	P/N	
Expansion Unit	6342060	Low voltage countries
Expansion Unit	6342061	High voltage countries
Line Cord	6952353	Brunei, Malaysia, Singapore, Hong Kong
Line Cord	6952317	Afghanistan, Indonesia, Surinam
Line Cord	6952308	Australia, New Zealand
Line Cord	6952371	Chile
Line Cord	6952285	Argentina, Paraguay, Uruguay
Line Cord	6952297	Bahamas, Barbados, Bermuda, Bolivia, Canada, Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea, Mexico, Netherlands Antilles,

## MACHINES

Line Cord	6952344	Nicaragua, Panama, Philippines, Taiwan, Trinidad
Line Cord	6952347	Bangladesh, Burma, Sri Lanka Peru, Thailand, Venezuela

**Prices:** For all local charges, contact your country financial organization.

**Customer Responsibility for Damaged or Altered Elements:** Determination by IBM that damage to replaced units is due to causes or conditions not covered under the terms and conditions of the Purchase or Maintenance Agreement and the repair of that damage or replacement of missing, altered or non-IBM parts will be charged for at IBM's then applicable hourly service rates and terms. Altered elements will not be eligible for exchange or replacement services.

**Customer Engineer On-Site Assistance:** If the customer desires assistance in performing CPAR, the customer calls the local IBM service branch office. IBM will assist the customer on-site in performing CPAR procedures using the same documentation that is available to the customer.

### Publications

- IBM 3979 Expansion Unit Setup Instructions (GA18-2272) low-voltage countries.
- IBM 3979 Expansion Unit Setup Instructions (GA18-2349) high-voltage countries.
- IBM 3192-G Color Graphics Display Station and IBM 3979 Expansion Unit Setup Instructions, (GA18-2590).
- IBM 3179-G/3192-G Color Graphics Display Station Description, (GA18-2589)

- IBM 3179-G/3192-G Color Graphics Display Station Operator Reference and Problem Solving Guide, (GA18-2591).

The applicable setup instructions are shipped with each unit.

The following publications contain supplemental information: They can be ordered from country publication centers.

- IBM 3179-G Color Graphic Display Station Description (GA18-2261)
- IBM 3179 Color Graphic Display Station Operator Reference and Problem Solving Guide, (GA18-2271)

## SPECIFY (NONE)

### CUSTOMER REPLACEMENT PARTS

The following part is not covered by an IBM maintenance agreement and must be purchased by the customer when replacement is needed.

Order from Country Telemarketing Representative.

Description	P/N
Field Packaging Material For Expansion Unit	6316868

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 3990 STORAGE CONTROL MODELS 1, 2, 3

### PURPOSE

The 3990 family of storage controls replaces the 3880 Storage Control Models 3 and 23. The 3990 offers improved environmental factors, price/performance, service, and function over the previous 3880 family. The 3990 is available in six models - two without cache and four with cache. Five of the models offer 4-path access to the new 3380 Enhanced Subsystem DASD.

All models attach to the new 3380 Models AJ4, BJ4, AK4, and BK4, as well as most of the older 3380 Models AA4, B04, AD4, BD4, AE4, and BE4.

The Model 3 provides all the functions of the 3880 Model 23 plus Cache Fast Write, up to 4.5Mb/sec. transfer rate on 3090 4.5M bps channels, larger cache sizes, and improved internal caching algorithms as basic cache functions. In addition, the Model 3 provides the Extended Functions, DASD Fast Write and Dual Copy.

### MODELS

Provides two or four control unit paths, called storage paths, for 3380 direct access storage.

**Model 1 001:** Each of the two storage paths provides for attachment of 3380 AA4s/AD4s/AE4s/AJ4s/AK4s (see M3380 pages). Storage Control 2-path, no cache

**Model 2 002:** Each of the four storage paths provides for attachment of 3380 AA4s/AD4s/AE4s/AJ4s/AK4s (see M3380 pages). Storage Control 4-path, no cache

**Model 3 003 (G03, J03, L03, Q03):** Cache with four storage paths that provide for attachment of 3380 AA4s/AD4s/AE4s/AJ4s/AK4s (see M3380 pages). Model G03\* - Storage Control 4-path, 32Mb cache. Model J03\* - Storage Control 4-path, 64Mb cache. Model L03\* - Storage Control 4-path, 128Mb cache. Model Q03\* - Storage Control 4-path, 256Mb cache.

\* Referred to generically as the Model 3

**Hardware Requirements:** Attaches to a 3090, 3084, 3083, 3081, 9370, and 4381 processor via 3.0 or 4.5M bps (3090 only) block multiplexer data streaming channel.

### Software Requirements

**MVS Environment:** MVS support for the IBM 3380/3880/3990 Storage Subsystem is provided by MVS/XA DFP Version 2 Releases 2.3 and 3.0, MVS/XA DFP Version 1 Release 1.3, MVS/370 DFP Version 1 Release 1.2 and PTFs to MVS/SP Versions 1 and 2. These releases and PTFs provide device support for 3990 Models 1 and 2, 3990 Model 3 basic cache function, the 3380 Model CJ2 and 3380 J and K Models (including connection to 3880 Models 3 and 23). ICKDSF Release 9.0 and EREP Version 3 Release 3.2 are also required. Related IBM software products providing device support include DFDSS, DFHSM, DFSORT, ISPF/PDF and IMS.

DFP support for 3990 Model 3 extended functions, dual copy and DASD fast write, will be available in a future release of MVS/XA DFP. An Early Support Program for these extended functions will begin in 4Q 1988.

**VM Environment:** VM support for the IBM 3380/3880/3990 Storage Subsystem is provided by programming enhancements to VM/SP Releases 4 and 5, VM/SP HPO Releases 4.2 and 5 and VM/XA SF Release 2. These enhancements provide CP, CMS and guest device support for 3990 Models 1 and 2, the 3380 Model CJ2 and 3380 J and K Models (including connection to 3880 Models 3 and 23, except VM/SP does not support the 3880 Model 23). This device support will also be provided in VM/XA SP Releases 1 and 2. ICKDSF Release 9.0 and EREP Version 3 Release 3.2 are also required, and device support is provided for VM/IPF via PTF.

It is IBM's intent to provide basic cache function support for the 3990 Model 3 in a release of VM/SP HPO in 1988 and a release of VM/XA SP in 1989.

The above statement is being made for planning purposes only and does not represent a firm commitment to deliver the product or to deliver the product by the specified date.

Highlights for the VM programming enhancements include the following:

- A new DASD migration command (MIG3380) may simplify the process of moving data between different 3380 Models (applies to VM/SP and VM/SP HPO only.)
- Device contingent connection allows operations to continue for other DASD units when a 'unit check' for one device has not been cleared.
- The CP FORMAT utility provides a 'check/nocheck' option to control read-back checking while formatting DASD devices.
- The CP TRACE command provides the option to trace virtual sense data at a user console or printer.
- Virtual I/O will allow guest use of the new CCW commands introduced by 3990 Models 1 and 2 support.
- Support is provided for 3990/3380 CJ2 service information messages (SIMs).

**VSE Environment:** VSE support for the IBM 3380/3880/3990 Storage Subsystem will be available 4Q87 in the then current refresh level of VSE/SP Version 2 and 1Q88 in the then-current refresh level of VSE/SP Version 3. Device support will be provided for 3990 Models 1 and 2, the 3380 Model CJ2, and the 3380 Model J, including connection of the 3380 Model J to the 3880 Model 3.

It is IBM's intent to provide support for the IBM 3380 Enhanced Subsystem Model K in VSE/SP Version 3 in 1988.

The above statement is being made for planning purposes only and does not represent a firm commitment to deliver the product or to deliver the product by the specified date.

**TPF Environment:** TPF support for the IBM 3380/3880/3990 Storage Subsystem is provided in the enhancement to TPF Version 2 Release 3 announced March 17, 1987. This enhancement provides device support for 3990 Models 1 and 2, the 3380 Model CJ2, and the 3380 J and K Models, including connection of the 3380 Models J and K to the 3880 Model 3. TPF support for these devices is provided for single uniprocessor environments.

**Limitations:** 3990 Model 3s operating at 4.5M bps on a 4.5M bps channel must precede all other storage controls on that channel in the order of physical channel cabling. It is recommended that all other 3990 models precede all other type model storage controls on all channels. The new 3990 Storage Control supports all models of the 3380 except 3380 Standard A04 Models, those AA4 Models with serial numbers between 10001 and 14999, and the 3880 Model CJ2.

**Maximum Configuration::** The following summarizes the various DASD A unit configuration choices.

Column 1	Column 2
2-Path A Units	4-Path A Units
-----	-----
3380 Standard A Unit (AA4) (except serial ranges 10001 to 14999)	Two 3380 Enhanced Subsystem A Units (AJ4 or AK4) (Two #9433)

3380 Extended  
Capability A Unit  
(AD4 or AE4)

3380 Enhanced  
Subsystem A Unit  
(AJ4 or AK4)  
(#9432)

### 3990 Model Configurations

#### Model 1

Configure up to two A units in any combination from Column 1 of the preceding figure. The same choice may be picked twice. The maximum configuration of two A units and 6 B units (3 B units per A unit) is 32 devices - the maximum allowable under a Model 1.

#### Model 2/Model 3 - Single Frame

Configure up to four A units from Column 1 or Column 2 or both in any combination (remember each choice in Column 2 is two A units) from the preceding figure except that 3380 Enhanced Subsystem A Units with features #9432 (2-path) and #9433 (4-path) can not be attached to the same storage control unit. Any choice may be repeated. The control unit is capable of addressing 64 devices. Maximum configurations are described in the following list.

- Four choices from column 1, each A unit fully configured with three B units.
- Two choices from column 2, each A unit fully configured with three B units.
- One choice from column 2 and two choices from column 1, each A unit fully configured with three B units but note restriction against intermixing features #9432 (2-path) and #9433 (4-path) on 3380 Enhanced Subsystem models.

#### Model 2/Model 3 - Dual-Frame

The Dual-Frame configuration option may be treated as two logical single frame configurations. The logical single frame is physically made up of two clusters, one in each of the two physical frames. Configure each logical single frame using the preceding rules. The two logical single frames do not need to have symmetric DASD configurations.

**Note:** Model 2 can only be dual-framed with another Model 2, a Model 3 can only be dual-framed with another Model 3.

**Customer Setup (CSU):** None.

### HIGHLIGHTS

The 3990 family of storage controls provides:

- 4-path access for performance, availability, and the capability of non-disruptive DASD installation of Enhanced Subsystem DASD (Models 2 and 3 only).
- Support for most commonly available 3380 DASD types for configuration flexibility.
- Upgradeability from the 2-path 3990 Model 1 to the 4-path Model 2 to the cached Model 3.
- Improved reliability, availability, and serviceability through power and maintenance boundaries, remote maintenance capability, backed by a 12-month warranty.
- Improved environmental factors; less power, less heat, less floor space than the 3880s with equivalent paths.
- Improved cache functions of the Model 3 offering:

- Larger cache sizes from 32Mb to 256Mb of IBM produced one megabit Dynamic Random Access Memory for high performance data access with low cost and high availability
- Cache - Host transfers at speeds up to 4.5M bps, when connected to 3090 processors with 4.5M bps channels, improving performance and lowering channel overhead
- With DASD Fast Write, written data will exhibit comparable performance benefits as does read data
- With Dual Copy, key system or application volumes may be duplicated to minimize system outages

### Standard Features:

- 4-channel switching
- Two-path DASD access (3990 Model 1)
- Two or Four-path DASD access (3990 Models 2 and 3 only)
- DASD Fast Write (Model 3 only)
- Dual Copy (Model 3 only)
- Cache Fast Write (Model 3 only)
- Read Track Command

### DESCRIPTION

#### Physical Specifications

Width - 1,124mm (44.25 in.)  
Depth - 813mm (32 in.)  
Height - 1,791mm (70.5 in.)  
(Canada only >

- 3990 Model 1  
Weight - 318kg (700 lbs)
- 3990 Model 2  
Weight - 381kg (840 lbs)
- 3990 Model 3  
Weight - 544kg (1,200 lbs) <)
- (Except Canada > 3990 Model 1  
Weight - 386kg (850 lbs)
- 3990 Model 2  
Weight - 449kg (990 lbs)
- 3990 Model 3  
Weight - 612kg (1,350 lbs) <)

#### Operating Environment:

Temperature: 16 to 32C (60 to 90F)  
Relative Humidity: 20 to 80 percent  
Wet Bulb: 23C (73F)

#### Publications:

The following publications are shipped with the product:

- Maintenance Information Volume A01
- Maintenance Information Volume A02
- Maintenance Support Volume A03 (Microfiche)
- Parts Catalog Volume A05 (Microfiche)

The following publications are available from the European Publications Centre (EPC) immediately:

- GA32-0098 IBM 3990 Storage Control Introduction
- GC22-7064 IBM System/360 System/370 4300 Processors Input/Output Equipment Installation Manual - Physical Planning
- GC35-0101 Cache Device Administration

The following manual will be available in 4Q, 1987.

- GA32-0100 IBM 3990 Storage Control: Planning, Installation, and Storage Administration Guide

The following manual will be available with the availability of the VM software.

- GC24-5372 Virtual Machine IBM 3990 Storage Control Models 1 and 2 and IBM 3380 Direct Access Storage Direct Channel Attach Model C22

The following manual may be ordered at General Availability.

- GA32-0099 IBM 3990 Storage Control Reference

The 3990 Models 1, 2, and 3 provide high performance for large capacity IBM direct access storage devices. These models provide the latest technology and design. They offer improved attachment flexibility, price/performance, capacity, function, and reliability. The 3990 attaches IBM 3380 DASD products - 3380 Standard Models AA4, B04, 3380 Extended Capability Models AD4, AE4, BD4, BE4, and the newly-announced IBM 3380 Enhanced Subsystem Models AJ4, AK4, BJ4, BK4. The 3990 is supported by MVS/XA, MVS/370, TPF, VM/SP, VM/SP HPO, VM/XA SP, VM/XA SF, and VSE operating systems. Operating system support will vary by 3990 model and function. See the IBM 3380 Direct Access Storage Enhanced Subsystem Models AJ4, BJ4, AK4, and BK4 announcement letter for the specific software environments supporting the 3990 Storage Control models and functions. 3380 Model AA4s with serial numbers 10001 to 14999 are not supported, neither is the 3380 Model A04. The 3990 Models 2 and 3 have twice the attachment capability of a 3880. The 3990 supports 3380 Standard Models AA4 and B04; 3380 Extended Capability Models AD4, AE4, BD4, and BE4 with Device Level Selection (DLS) support mode (two-path access); and Enhanced Subsystem Models AJ4, AK4, BJ4, and BK4 with Device Level Selection Enhanced (DLSE) support mode (four-path access) or DLS support mode (two-path access). The 3990 Models 2 and 3 allow the intermix of 2-path strings headed by AA4, AD4, or AE4 units with 4 path Enhanced Subsystem DASD. The 3990 Model 1 is only capable of 2-path access.

The 3990 is available in models containing either one or two storage clusters. Each cluster has two data paths and four or eight CPU channel interfaces. In addition, each cluster has independent power (the AC power to the unit is shared in two cluster models) and cluster support facility. The cluster support facility includes a support microprocessor, diskette drive, and operator panel. Each cluster is designed such that it can be operated and serviced independently of the other cluster. Model 1 consists of one storage cluster and the Models 2 and 3 consist of two storage clusters. Each cluster contains two internal data paths from attached devices to CPU channel interface. The Models 2 and 3 can support four concurrent data transfer operations, in contrast to the 3880, which supports only two.

New with the 3990 is the Read Track command, which provides improved performance for IBM DFDDSS and fixed length data transfer operations of IBM DFSORT by transferring all records from a device track without first having to determine the number of records on the track or having to clear storage prior to reading tracks. The combination of the ability to read any track format and the placing of an "end-of track" identifier in storage, reduces CPU time required for IBM DFDDSS.

The 3990 Model 2 also offers significant environmental improvements. A Model 2 (four paths) requires only 35 square feet of floor space including service access, as opposed to 105 square feet for two 3880 Model 3s (four paths), almost a 70 percent reduction. The power requirement of a Model 2 is a little more than half that of two 3880 Model 3s. A Model 2 puts out about 40 percent less heat than two 3880 Model 3s.

**Cache Storage Control Models:** The Model 3 is available in cache sizes of 32, 64, 128, and 256Mb of randomly-accessed electronic storage and uses the one megabit chip dynamic random access memory (DRAM) technology. The Model 3 dynamically manages the contents of the cache by a Least Recently Used (LRU) algorithm to maximize the high speed cache accesses in the DASD subsystem.

Cache - Host transfers can occur at speeds up to 4.5 Mb/second on 3990 Model 3s when connected to IBM 3090 processors with 4.5 Mb/second channels. Direct cache to host transfers occur on read hits and, if DASD fast write or Cache fast write is being used, on write hits. Read and write misses operate at DASD speed.

The Model 3 provides a cache fast write function that offers high performance for temporary data. For this type of data, direct DASD accesses may be eliminated if there is sufficient cache space to hold this data during its life.

A cached Model 3 (four paths) requires only 35 square feet of floor space including service access, as opposed to 105 square feet for two 3880 Model 23s (four paths), almost a 70 percent reduction. The power requirement of a Model 3 is almost half that of two 3880 Model 23s. A Model 3 develops about half the heat of two 3880 Model 23s.

The Model 3 provides as basic functions all the functions of the IBM 3380 Model 23 plus Cache Fast Write, improved RAS, improved performance, larger cache sizes, and improved internal caching algorithms. In addition, the Extended Functions, DASD Fast Write and Dual Copy, are provided.

**Nonvolatile Storage:** The Model 3 incorporates a Nonvolatile Storage (NVS), which provides 4Mb of storage with battery backup. The 4Mb NVS provides up to 48 hours of battery back-up with the battery fully charged. The Extended Function enabled by NVS includes Dual Copy and DASD Fast Write.

**Dual Copy:** The 3990 Model 3 utilizing Dual Copy provides increased data availability with increased performance over non-cached DASD by maintaining two copies of key DASD volumes and providing dynamic switching to the secondary or back-up copy in the event of failure in accessing the primary volume. Also, a permanent data error on a portion of the primary volume is recoverable by rereading the copy of the data from the secondary volume. The failed primary track can then be recovered later. Although control unit overhead to maintain two copies of data is increased, the combination of dual copy and DASD fast write offers improved subsystem performance over the predecessor cache product - the 3880 Model 23.

**DASD Fast Write:** DASD Fast Write extends the benefits of cache performance to writes as well as reads. DASD Fast Write also provides improved performance for dual copy while still providing two copies of data. With DASD Fast Write, customers no longer need to concern themselves with read-to-write ratios as they did with the 3880 Model 23, thus making pre-installation analysis easier. DASD Fast Write simultaneously writes to cache and to NVS, disconnects from the channel, and asynchronously writes to DASD using internal algorithms. With use of DASD Fast Write, new candidates for caching include IMS message files, IMS and DL/1 logging volumes, and other volumes with substantial write activity.

**RAS Features:** The 3990 Storage Control family offers improved reliability, availability, and serviceability as compared to the 3880 Storage Control. The 3990 family comes with a 12-month warranty. The 3990 provides improved RAS due to:

- The capability of non-disruptive installation of 3380 Models BJ4 and BK4 and the second pair of AJ4s or AK4s on Models 2 and 3 in four-path configurations.
- Concurrent maintenance improvements that minimize repair actions that cannot be performed concurrently with normal operation on the Models 2 and 3.
- Improved failure isolation that captures error data at the time of failure and identifies the failing Field Replaceable Unit(s) (FRUs).
- Minimizing single points of failure.
- Improved error reporting is provided through Service Information Messages (SIM). The operator is notified by the operating system when a failure has been detected; the scope of the failure; a code to give to the service organization that tells what replacement parts to bring; and what part of the system will be unavailable while the repair is being effected.

Support processors, one per cluster, provide support for the following RAS enhancements:

- A microcode patch area prevents the loss of microcode patches in power down situations.
- Outboard error logging, a stand alone error analysis feature, reduces problem determination time by writing error data to the diskette and creating a consolidated failure record.
- A remote maintenance facility provides the capability of remote diagnostic communication with the Support Center for storage control problems.

Improved system availability is provided by minimizing single points of failure that lead to loss of access to data. This is accomplished by:

- Separate power boundaries, one per cluster
- In Model 3s, separate power boundaries each for cache and nonvolatile storage
- For Model 3 cache storage, single and double-bit error detect and correct, triple-bit error detect, soft error correct

**Dual Frame:** To ensure even greater data availability, Models 2 and 3 offer a Dual Frame Configuration capability, which interconnects two 3990 models such that paths to a DASD string are split across frames. The dual frame configuration ensures that if one storage control is unavailable, then the associated disk drives are still addressable by the other half of the dual frame storage control unit. There is no single point of failure except room power.

Dual frame configurations are formed by abutting two Model 2s, or two Model 3s, together. The channel switching features of the two boxes to be dual framed must be identical. The Model 3s need not have identical cache sizes.

**Performance:** The following performance information has been derived from analytic models. This technique has been tested with success in predicting performance of prior products both cached and non-cached. The model used in this section predicts subsystem performance in terms of response time in milliseconds versus throughput in start I/Os per second. Hit ratios for cache runs are generated by extrapolating hit ratios seen on current cache devices to the larger cache sizes of the 3990 Model 3.

The following statements summarize the performance gains of the 3990 versus the 3880 in a MVS/XA environment. The 3880s have 3380-E DASD in 2-path connect mode on 3.0M bps channels. The 3990 Models 2 and 3 are connected to 4-path 3380-K DASD. The 3990 Model 3 is operating on a 4.5M bps channel. The total arms are equal (32 E actuators vs. 32 K actuators). The data on the 3380-E actuators has been placed directly on the 3380-K actuators. In this comparison two 3880s are compared with one 3990, the number of directors or paths (4) are equal.

- The 3990 Model 2 can provide up to 30 percent greater throughput than two 3880 Model 3s at 22ms response time.
- The 3990 Model 3 can provide up to two and a half times the throughput of a 3990 Model 2 at 22ms response time.
- The 3990 Model 3 using DASD Fast Write can provide up to three times the throughput of a 3990 Model 2 at 22ms response time.
- The 3990 Model 3 can provide up to two times the throughput of a 3990 Model 2 with a 45 percent reduction in response time.
- The 3990 Model 3 using DASD Fast Write can provide up to two and a half times the throughput of a 3990 Model 2 with a 45 percent reduction in response time.
- The 3990 Model 3 at 150 accesses per second can reduce response time up to 60 percent as compared to a 3990 Model 2.

**3990 Model 1 Performance:** For the following comparison of 3990 Model 1 and 3880-3, one control unit with 16 actuators of 3380-J and 16 actuators of 3380-D are used, respectively. The 3990 Model 1 can provide increased throughput of up to 10 percent above that of the 3880 Model 3.

**Note:** These estimates of performance are based on modeled data, not representative of all environments. Results for other installa-

tions, workloads, and environments will vary and must be assessed on an individual basis. Accordingly, these estimates do not constitute a performance guarantee or warranty.

## SPECIFY

- Power Supply, specify one:

#9001 All 50 Hz (except Japan)  
#9002 All 60 Hz (except Japan)  
#2005 All 50/60 Hz (Japan only)

- Power for AC, 3-phase, 5-wire, 50 Hz (not Japan):

50 Hz  
200V #2807  
220V #2815  
230V #2827  
240V #2818  
380V #2816  
400V #2825  
415V #2826

- Power (AC, 3-phase, 4-wire):

60 Hz  
200V #2733  
208V #9903  
220V #2800  
240V #9915

- Power (AC, 3-phase, 4-wire) (Japan only):

50 Hz  
200V #2807  
220V #2815  
240V #2818

- Machine Nomenclature:

Brazilian (Portuguese) #2938  
French Canadian #2935  
Japanese #2930  
Spanish #2931  
UK English #2927  
US English #2924

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.

- 3380 Model AA4 Support: Specify #9003 for each 3380 AA4 that is attached to a 3990.

**Note:** 3380 AA4s with serial numbers between 10001 and 14999 are not supported. Maximum: two on a 3990 Model 1; four on Models 2 and 3.

## SPECIAL FEATURES

**Four Channel Switch, Add'1 (#8172):** The Four Channel Switch, Add'1 Feature allows up to eight channels to access a cluster in a 3990 storage control unit. A different set of eight channels may be attached to the other cluster (Model 2 or Model 3) in that storage control unit. Order one for a 3990 Model 1; order two for all other models.

If this is being added to a machine that has either #6149 or #7149 installed then feature codes #6150 or #7150 must be ordered, respectively. Maximum: Two Field Installation: Yes. Prerequisites: None.

**Remote Switch Attachment For Four-Channel Switch (#6149):** Removes the four enable/disable switches provided per cluster by the Four-Channel Switch from the 3990 operator panel and allows them

to be relocated to a remote configuration control panel. Order one for a 3990 Model 1; order two for all other models. If feature #8172 is installed or ordered, then feature #6150 must be ordered in addition. Maximum: Two. Field Installation: Yes. Prerequisites: None.

**Remote Switch Attachment For Four-Channel Switch, Add'l (#6150):** Removes the four additional enable/disable switches provided per cluster by the Four-Channel Switch, Add'l (#8172) from the 3990 operator panel and allows them to be relocated to a remote configuration control panel. Order one for a 3990 Model 1; order two for all other models. Maximum: Two. Field Installation: Yes. Prerequisites: #8172, #6149.

**Local Remote Switch Attachment For Four-Channel Switch (#7149):** Four switches per cluster can be enabled/disabled from the 3990 operator panel or from a remote configuration control panel. Order one for a 3990 Model 1; order two for all other models. If feature #8172 is installed or ordered, then feature #7150 must be ordered in addition. Maximum: Two. Field Installation: Yes. Prerequisites: None.

**Local Remote Switch Attachment For Four-Channel Switch, Add'l (#7150):** Four switches, add'l per cluster can be enabled/disabled from the 3990 operator panel or from a remote configuration control panel. Order one for a 3990 Model 1; order two for all other models. Maximum: Two. Field Installation: Yes. Prerequisites: #8172, #7149.

## MODEL CONVERSIONS

3990 machines that can be field model converted are:

- 3990 Model 1 can be field model converted to a 3990 Model 2.  
If the 3990 Model 1 has special features #8172, #6149, #6150, #7149, or #7150 installed then these features must be ordered once more for the upgrade.
- 3990 Model 2 can be field model converted to a 3990 Model 3.
- 3990 Model 3 Models can be field model converted to a 3990 Model 3 Model with a larger cache storage size.

A purchased upgrade may be applied only to a purchased storage control unit; a rental (MRC) upgrade may be applied only to a rental (MRC) storage control unit.

Parts removed or replaced when field model converting a machine become the property of IBM.

## ACCESSORIES (NONE)

## MACHINE ELEMENTS (NONE)

## SUPPLIES (NONE)

## 4055 INFOWINDOW DISPLAY

### PURPOSE

The 4055 InfoWindow Display provides the ability to display both NTSC formatted composite video from a videodisc player and RGB formatted text and graphics from an IBM Personal Computer on its color display monitor. Dual stereo speakers contained within the 4055 provide audio output. Images from an attached non-IBM videodisc player and IBM Personal Computer can be presented individually or simultaneously through the use of an overlay technique. The user can control the presentation sequence through the use of a touch-sensitive screen or the computer keyboard.

### MODELS

#### Model 1 001: InfoWindow Display

The standard model consists of a 13-inch color display monitor with touch screen, RGB cable, Personal Computer Graphics Sync cable, "Hardware Maintenance and Service Manual" with advance diagnostic diskette, Guide to Operations with system diskette, and a six foot power cord.

#### Prerequisites:

- IBM 4055 Control Program (P/N 8575139)
- IBM Personal Computer

Each 4055 must be attached to an IBM Personal Computer (5150), Personal Computer XT (5160), or Personal Computer AT (5170), with a minimum of 256K of memory and one dual-sided diskette drive configured as follows:

- 1501200 #1200 Enhanced Graphics Adapter
- 1501201 #1201 Graphics Memory Expansion Card
- 2720020 #5040 General Purpose Interface Bus (GPIB) Cable
- 6451503 #1503 General Purpose Interface Bus (GPIB) Card
- 8575146 #6583 Enhanced Graphics Adapter Jumper Card
- 6280057 #0057 DOS 3.2

**Note:** It is desirable that the Personal Computer have two diskette drives or one diskette drive and a hard disk if used for program development. Preparation of presentations may require additional memory.

The laser videodisc player is optional and is available from original equipment manufacturers (non-IBM). The videodisc player provides audio and still and motion video capabilities. The 4055 will accommodate attachment of one or two compatible videodisc players through the appropriate RS-232-C or IEEE488 interface. If two videodisc players are attached, they must be of the same make and model and be attached via the IEEE488 parallel interface.

The IBM BERMUDA Display has an interface capable of attaching the following non-IBM videodisc players or their functional equivalent:

Make/Model	Attachment Mode	
	RS-232-C PORT	IEEE488 PORT
Pioneer LD-V6000	X	
Pioneer LD-V6000 With SWSD Processor SS-D1	X	
Pioneer LD-V6200		X

**Note:** The appropriate cables are required to attach the videodisc player to the 4055. Cables for video and audio connections should be obtained from the videodisc player manufacturer. Consult the announcement letter for general availability schedules for one and two videodisc player support and support of the SS-D1 (sound over still) capability.

IBM Branch Office personnel in response to customer requests for additional interface specifications should contact IBM Corporate Industry Relations.

**Customer Setup (CSU):** The 4055 is designated customer setup thereby offering the customer early availability and relocation flexibility. Set-up procedures are included in the Guide to Operations which is shipped with each machine. A clear indication that the machine is operational will be given.

**Programming Support:** Operation of the 4055 is dependent upon the IBM InfoWindow Control Program (5875-MMM, #5139) and appropriate user applications development. Applications development programs for the 4055 are provided by Video/PASSAGE Multimedia Authoring System (5875-MMM, #3823) and Video/PASSAGE Multimedia Presentation System (5875-MMM, #3822).

### HIGHLIGHTS

- **Video Control:** The 4055 contains a (0.31mm dot pitch) dual-frequency 13-inch color monitor capable of displaying both NTSC composite video and RGB text and graphic images. The monitor is capable of displaying text and graphics from the Personal Computer up to 640 x 350. The monitor can display video or overlay text and graphic images on NTSC composite video in low frequency mode (up to 640 x 200). Text and graphic images can be displayed up to 640 x 350 in high-frequency mode or 640 x 200 in low frequency mode. In each frequency, the monitor can display 16 digital (RGB) colors from a 64-color palette, and is capable of displaying 40 or 80 characters per line (25 lines).

The 4055 also includes ports for an auxiliary NTSC composite monitor and for an additional RGB monitor or projection screen.

**Note:** Applications being developed to utilize the optional attachment of a projection screen or RGB monitor should be designed to operate at a single frequency (15.75 or 21.85K Hz) due to limitations of currently available devices and to use any color for transparency except black.

- **Touch-Sensitive Screen Control:** The 4055 has a touch-sensitive screen with up to 60 variable-touch areas, which can be used as an input device. The application author can vary the touch area location, size of the touch area, and number of touch areas per screen within the above parameters. Touch inputs may be detected as X-Y coordinates from 0 to 255 or in row-column position corresponding to video text positions, or in 'key table' mode. In key table mode, up to 60 application defined keys (touch targets) can be loaded into the display logic with response to touch input indicating the key touched. An audio feedback can be programmed to provide an indication when a touch has been sensed by the display. By user response to the touch screen or keyboard, the presentation can be modified through pre-programmed options. User selections can be recorded for later tabulation.

- **Audio Control:** The 4055 contains dual stereo speakers and ports for an external stereo amplifier with speakers and for a set of headphones. If headphones are plugged into the available port, the integrated stereo speakers are disabled. The volume for the internal speakers or head phones may be adjusted via a control on the front of the display.

The audio card in the display contains a voice synthesis chip with 218 prerecorded words and sounds stored in ROM for playback of stored digital speech. Additional words can be read from a PC diskette or hard disk to extend the vocabulary. Words to be used for this 'external speech' function must be recorded, digitized, and stored by the user.

The optional videodisc player can provide the majority of pre-recorded audio needed for presentations. Audio from a

videodisc can be played over a still composite video frame when using a sound over still option provided by the videodisc player manufacturer. This still frame with sound capability allows the user to accompany one video frame with sound from the videodisc. Multiple frames may be used to extend the duration of the audio. Certain additional videodisc features may be required to support this capability.

**Operating Environment:**

Voltage: 120V AC Single-Phase, 3-wire, 60 Hz  
Temperature: 15.6 to 32.2C (60 to 90 degrees F)  
Humidity: 8 to 80 percent RH

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site preparation and planning.
2. Receipt, unpacking and placement of the system.
3. Physical setup including the connection of cables between the display, IBM Personal Computer and optional non-IBM equipment (i.e., videodisc player) and initial test of the equipment.
4. Using and following the Problem Determination Procedures to diagnose a failing unit before calling IBM for service.
5. Providing a desk or table top or a suitable kiosk for the display and supporting units.
6. Acquiring a suitable non-IBM videodisc player if required, attaching cables, and ensuring delivery in time to install as part of the system.
7. Reviewing the recommendations in the "IBM InfoWindow Site Planning Guide" (GA27-3743) and insuring adequate access of the machine for repair by the IBM Customer Engineer. The customer is responsible for removing the machine from a kiosk if the kiosk does not provide adequate access to the machine by the IBM Customer Engineer.

**Problem Determination:** Problem Determination Procedures are provided with the 4055 to enable the customer to determine the failing unit (i.e., PC, InfoWindow Display, or Videodisc Player). The problem determination procedures are provided in the "4055 InfoWindow Display Guide to Operations". The problem determination procedures for the IBM Personal Computer are covered in its own documentation.

**Publications:** The following publications are available for the 4055 InfoWindow Display:

- GA27-3743 Site Planning Guide
- GX27-3671 IBM InfoWindow Guide to Operations (Shipped with each 4055 includes: Guide to Operations Text, Binder, Slip case, Tabs, Label Sheet, Diagnostic diskette (with plastic diskette holder))

- SX27-3665 IBM InfoWindow Hardware Maintenance and Service (Shipped with each 4055 includes: Hardware Maintenance and Service Text, Binder, Slip case, Advanced diagnostic diskette)
- G580-0689 IBM InfoWindow System (Executive Brochure)
- G580-0692 IBM InfoWindow System (Hardware Brochure)

A videodisc presentation entitled "Exploring the IBM InfoWindow System" (GV30-0169), consisting of a videodisc and diskettes designed to be run on the 4055, a Personal Computer XT or AT with 512K memory and a 10MB fixed disk and a compatible videodisc player, is available for customer information and demonstration. The purpose of the videodisc is to introduce the concepts of interactive videodisc technology, applications, and IBM hardware/software. This videodisc has been sent to all demonstration locations. Additional copies are available from Mechanicsburg.

See Personal Computer sections of the sales manual for appropriate Personal Computer publications.

**SPECIFY**

- (Canada only > Color: Standard color is pearl white for the front bezel and shell gray for covers.

**SPECIAL FEATURES (NONE)****MODEL CONVERSIONS (NONE)****ACCESSORIES**

**4055 Tilt and Swivel Adapter (P/N 8575140, #3660\*):** Allows vertical and horizontal adjustments to the 4055 InfoWindow Display. The tilt/swivel base allows for tilt angles of -5 degrees to 15 degrees from vertical and allows for rotation angles of +/- 180 degrees from centerline.

**9-Foot Power Cord (P/N 6952300, #4770\*):** 9-foot power cord (a 6-foot power cord is standard).

\* For shipment with the machine, use the feature number.

Accessories can be ordered for installed machines by specifying part number.

**SUPPLIES (NONE) <**

## 4201 PROPRINTER

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 4201 Proprinter is a serial wire-matrix impact printer that attaches to the 3192 mdl G or 3979 mdl 1 (when attached to the 3192-G only), IBM Personal Computers PC/AT/XT/XT370/AT370 Industrial Computer, Portable PC, 3270 PC (Control Program Version 1.2 and 2.0), 3270 PC/G, 3270 PC/GX, (Canada (English only) > and 3194 mdl H50 with #4899 - P/N 1614899, 3194 (except the mdl H50) with P/N 1525612, <) 3192 display station mdls C and D and 3197 display station mdls C and D. In addition, the 4201 is designed for hardware and software capability with certain non-IBM hosts. Attachment is via the parallel interface (standard) or asynchronous serial interface (optional) and attachment cable. (Non-IBM Personal Computers may require a different cable. Check with your IBM authorized dealer at point of sale for assistance.) Included with the 4201 Proprinter is one ribbon cartridge, continuous forms guide, a 1.8m (6 ft) power cord, "IBM 4201 Guide to Operations", service/exchange center form, and an inventory checklist. The 4201 is a customer set-up, purchase only product.

### MODELS

**Model 1 001:** (No Longer Available) Includes integrated tractor and friction forms feeding with integrated front sheet feed for cut sheets and envelopes.

**Limitations:** Continuous Forms: Pinfeed continuous forms can be used.

Both edges of the pinfeed forms must be threaded through the tractor. No fasteners are permitted in the areas exposed to the printhead.

Printer Operation and print quality vary with paper and number of copies. Multipart forms should be tested in operating conditions to verify that results are satisfactory. The forms thickness lever must be varied to accommodate differing paper weight and thickness.

**Paper Specifications:** Maximum continuous forms paper width is 254mm (10 in.) --- Maximum print-line width is 203.2mm (8 in.).

**Front Sheetfeed:** Front sheetfeed is accomplished by hand insertion. One-part continuous feed paper can remain in the printer while you use cut forms or envelopes of the same or narrower width than the continuous forms.

**Paper Width:** Cut form - 76.2mm to 279.4mm (3 in. to 11 in.) --- Continuous forms - 76.2mm to 254mm (3 in. to 10 in.) --- Print standard 241.3mm (9 1/2 in.) wide envelope.

**Paper Weights:** Single part - 12-24 pound 0.0023 in. - 0.0045 in. thickness.

**Multi-part forms:** One- and three-part forms use 10 to 15 pound paper (0.0019 in. - 0.0023 in. thickness). Four-part forms use 10 to 12 pound paper (0.0019 in. - 0.0023 in. thickness). For multi-part forms, thickness must not exceed 0.014 in.

Paper over 24 pound must be tested for acceptable operation and legibility.

**Non-IBM Hosts:** The 4201 Proprinter attaches to the following non-IBM PCs via the parallel or the serial interface and the appropriate attachment cable.

These non-IBM personal computers have been tested with the IBM Proprinter by IBM using the indicated software with the following results. This does not imply lack of compatibility with other non-IBM personal computers that may not have been tested.

PC	DEGREE OF CAPABILITY	SOFTWARE PACKAGES	MODIFICATIONS
Compaq Deskpro	Compatible	Peachtext Multiplan	Parallel attachment without modification
Compaq Portable	Compatible	Peachtext Multiplan	Parallel attachment without modification
AT&T (Mdl 6300)	Compatible	Peachtext Multiplan	Serial attachment Parallel attachment without modification
Apple IIE Apple IIC	Full text No graphic	Appleworks	Serial attachment Apple Cable Normal print mode only

**Customer Setup (CSU) and Responsibilities:** The IBM 4201 Proprinter is designated a customer setup machine. The marketing representative must advise the customer of his/her responsibilities before receipt of the machine. Customer setup instructions are included in the "IBM Proprinter Guide to Operations".

### HIGHLIGHTS

- Multiple speed serial impact printing
  - 200 cps DP mode
  - 100 cps text mode
  - 40 cps near letter quality mode

- Integrated front sheet feed for envelopes, cut sheet, etc.
- Document on demand - tractors below print line
- Up to four-part forms
- Drop in "clean hands" ribbon cartridge
- Integrated tractor and friction feed
- APA (all points addressable) graphics
- Maximum 203.2mm (8 in.) print line
- Program selectable line spacing 1/6, 1/8, 7/72, n/72, n/216\*

\* Printer recognizes n/216 in. spacing commands; the smallest individual line increment is 1/144 with corrections made every third print line to obtain apparent n/216 spacing.

- 76.2mm (3 in.) to 279.4mm (11 in.) wide paper can be used with the front sheet feed
- 76.2mm (3 in.) to 254.0mm (10 in.) wide paper can be used with the continuous forms feed
- Bottom of forms printing: 12.7mm (0.5 in.)
- IBM PC compatible parallel interface (standard)
- Optional asynchronous serial interface module - customer purchase and install
- Optional 5K print buffer - customer purchase and install

#### Physical Specifications:

Height - 133.4mm (5 1/4 in.)  
Width - 419.1mm (16 1/2 in.)  
Depth - 355.6mm (14 in.)  
Weight - 7.94 KG (17.5 lb.)

#### Publications:

- Hardware Maintenance Service
  - English (P/N 6328946)
  - French (P/N 6252695)
  - German (P/N 6185906)
  - Italian (P/N 6252696)
  - Spanish (P/N 6252697)
- Guide-To-Operations
  - Canadian French (P/N 6493171)
  - Danish (P/N 6185897)
  - English (US/UK) (P/N 6328945)
  - Finish (P/N 6185898)
  - French & Belgium French (P/N 6185899)
  - German (P/N 6185900)
  - Italian (P/N 6185901)
  - Netherlands & Belgium Dutch (P/N 6185895)
  - Norwegian (P/N 6185896)
  - Spanish (P/N 6185902)
- Technical Reference
  - English US (P/N 6328947)
  - German (P/N 6185905)

#### SPECIFY

One asynchronous serial interface module option #3000 (P/N 6493187).

One 5K print buffer #4000 (P/N 6493188).

- (Canada only > Voltage (120V AC, 1-phase, 60 Hz); No specify required. Standard power cord is 1.8m (6 ft.). <)
- (Except Canada > Power: 220/230/240V AC, 1-phase, 50/60 Hz. No specify required.
- A 2.8m (9.2 ft) power cord is supplied with the machine. The Country will select a power cord plug to the specifications most commonly used in that country. See configurations for order information. <)
- Attachment cable (required to cable connect the 4201 Proprinter to IBM Personal Computer):
  - #5612 (P/N 1525612) for parallel IBM PC interface cable.
  - #6031 (P/N 8509386) for asynchronous serial attachment cable.
- Attachment cable (required to cable connect the 4201 Proprinter to the 3192 mdi G or 3979 mdi 1 (when attached to the 3192-G only)):
  - #2058 (P/N 6342058) for interface cable.
- Color: Pearl White only (no specify required).
- Language: English (no specify required).

#### SPECIAL FEATURES

Asynchronous Serial Interface, #3000 (P/N 6493187).

5K Print Buffer, #4000 (P/N 6493188).

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES

Attachment Cable: Required to cable connect the 4201 Proprinter to the host. Specify #5612 (P/N 1525612) for IBM parallel attachment 1.8m (6 ft). Specify P/N 8509386 for serial attachment 6m (19.5 ft). Specify P/N 6457008 for the attachment to 3192 display station mdi C and D and 3197 display station mdls C and D.

#### SUPPLIES

**Ribbons:** The IBM 4201 black fabric ribbon (P/N 6328829) or equivalent. None required with machine order.

## 4201 PROPRINTER II

### PURPOSE

The 4201 Proprinter II printer is a high speed, near letter quality printer for attachment to IBM Personal Computers and compatible non-IBM PC hosts. The narrow carriage IBM Proprinter II includes the functions of the IBM Proprinter XL in addition to providing an alternate NLQ font and a fast 12-pitch draft speed. The Proprinter II is an enhanced replacement product for the Proprinter.

### MODELS

#### Model 2 002

#### Limitations:

1. Continuous forms: Both edges of the pinfeed forms must be threaded.
2. Paper Specifications: Maximum paper width is 279.4mm (11.0 inches). Maximum pin-to-pin width for continuous forms is 254mm (10.0 inches). Maximum print-line width is 203.2mm (8.0 inches).
3. Single sheetfeed: Single sheetfeed is by manual front insertion.

**Prerequisites:** For parallel attachment, the IBM PC Printer Attach Cable (P/N 1525612, #5612) is required and must be ordered separately.

**Customer Setup (CSU):** The IBM Proprinter II is designated as a customer set-up (CSU) box. A customer "Guide To Operations Manual" is provided with this printer. CSU allowance is one day. IBM set-up service is available from the IBM National Service Division at IBM hourly service rates and minimums.

### HIGHLIGHTS

- High Speed Printing
  - 200-240 cps (Fastfont) burst speed in draft mode
  - 40 cps in near letter quality mode
- Easy to Control Printing
  - Operator panel menu selection of print modes
  - User controlled quiet mode for DP printing
- Versatile Printing
  - Seven pitches (5, 6, 8.55, 10, 12, 17.1 cps, proportional)
  - 4K Standard Print Buffer
  - Double high printing
  - Alternate NLQII font (Courier 10/12 cpi)
  - All points addressable (APA) graphics
- Flexible Paper Handling
  - Continuous forms
    - Power assisted paper loading
    - Built-in variable width tractor
    - Document-on-demand for easy tear off of form just printed
  - Single sheets and forms
    - Convenient front sheet feed
    - Standard friction feed
- Easily installed, "clean hands" ribbon cartridge with a yield of three million draft mode characters.

### DESCRIPTION

The IBM Proprinter II is a new member of the Proprinter family and attaches to IBM Personal Computers, to compatible non-IBM personal computers, and to certain displays. The printer offers three software or operator selectable burst print speeds of 40 cps (Near Letter Quality), 120 cps (Emphasized-Fastfont) and 240 cps (DP mode-Fastfont). Speed is dependent on the selected print mode and pitch. Graphics and text modes may be alternately used in the same document.

The IBM Proprinter II printer offers one-button selection of quality and quiet mode. In addition, the operator may use the printer setup mode to select Fastfont, double high printing, double wide printing, 12 or 10 of spi, condensed print, emphasized print, NLQ II font, or printer reset to initial defaults.

The 4201 Proprinter II uses the IBM 4201 Proprinter ribbon, a black fabric ribbon in a "clean hands" cartridge for easy installation.

The printer attaches to the IBM Personal Computer via the IBM PC printer attach cable. Attachment to other than the IBM Personal Computer may require a different cable.

An optional asynchronous serial interface and an optional 8K print buffer are also available.

The Proprinter II attaches to the following IBM Personal Computers:

- Personal Computer (5150)
- Portable Personal Computer (5155)
- Personal Computer XT (5160)
- Personal Computer XT Model 286 (5162)
- Personal Computer XT/370 (5160 Model 589)
- Personal Computer AT (5170)
- Personal Computer AT/370 (5170 Models 599, 739, 919, 939)
- RT Personal Computer (6150 and 6151)
- 3270 Personal Computer (5271) (DOS 2.1/3.1/3.2; CP 1.2.2/2.1/3.0)
- 3270 Personal Computer AT (5273) (DOS 3.1/3.2; CP 2.1/3.0)
- 3270-PC/G and GX (5371)
- 3270-PC AT/G and AT/GX (5373)
- IBM Personal System/2 Model 30
- IBM Personal System/2 Model 50
- IBM Personal System/2 Model 60
- IBM Personal System/2 Model 80
- IBM PC Convertible
- PCjr (4860)
- Displays
  - 3161, 3162, 3163, 3164
  - 3192 Models C, D (requires cable P/N 6457008)
  - 3192 Model G (requires cable P/N 6342058)
  - 3194 Models C, D, H (Canada only) > (except the H50) < require cable P/N 1525612
  - 3197 Models C, D (requires cable P/N 6457008)

#### Local Area Networks

The Proprinter II is compatible with systems configured with the following hardware and software products:

- DOS 3.3
- PC Local Area Network Program Version 1.2
- IBM PC Network Protocol Driver Program
- IBM Local Area Network Support Program
- IBM Token-Ring Network PC Adapter
- IBM Token-Ring Network PC Adapter II
- IBM Token-Ring Network Adapter/A
- IBM PC Network Adapter II
- IBM PC Network Adapter II/A
- IBM Personal System/2 Model 30
- IBM Personal System/2 Model 50
- IBM Personal System/2 Model 60

**Physical Specifications:**

Width - 419.1mm (16.5 in.)  
Depth - 350.5mm (13.8 in.)  
Height - 127.0mm (5.25 in.)  
Weight - 8.43 kg (18.1 lbs) US & Canada, 8.85 kg (19.5 lbs) all other countries

**Operating Environment:**

Temperature - 10 - 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent

**Publications:** The IBM Proprinter II Guide to Operations (SC31-3711) is shipped with the IBM Proprinter II.

The following publications are available:

- IBM Proprinter II/Proprinter XL Guide To Operations (SC31-3711)
  - English US, P/N 87X9804
  - French Canadian, P/N 87X9794
  - Spanish, P/N 87X9769
- IBM Proprinter II Hardware Maintenance and Service Supplement (SN31-8034)
- IBM Proprinter Hardware Maintenance and Service Manual (SC31-3552)
  - English US, P/N 87X9798
  - Spanish, P/N 87X9724
  - French, P/N 87X9779

- IBM Proprinter Technical Reference Manual (available 7/13/87) (SC31-2587), English US, P/N 87X9703

**SPECIFY**

- (Canada only) > Voltage: US and Canada 120V AC, 1 phase, 60HZ, P/N 87X9800. <
- (Except Canada) > Power: 100-110V, 50/60 Hz, P/N 87X9717; 115-120V, 50/60 Hz, 87X9712; 200-208V, 50/60Hz, P/N 87X9707; 220-240V, 50/60 Hz, P/N 87X9792. <
- Cable Lengths (required to cable connect the IBM Proprinter Printer Model 2 to a Personal Computer): Cable length is 1.8 meters (6 feet). Order P/N 1525612 for the IBM 5150 and 5160.
- Color: Single color only (no specify required).
- Guide to Operations Manual.

**SPECIAL FEATURES**

IBM PC Parallel Attach Cable, P/N 1525612, #5612  
IBM PC Serial Attach Cable, P/N 8509386, #6031

**SUPPLIES**

**Ribbons:** IBM 4201 Proprinter Ribbon, P/N 6328829

## 4202 PROPRINTER XL

### PURPOSE

The 4202 Proprinter is an XL, a wide carriage serial dot matrix printer for attachment to IBM Personal Computers; Personal Computer Jr. (4860), Personal Computer (5150), Portable Personal Computer (5155), Personal Computer Convertible, Personal Computer/XT (5160), Personal Computer/XT/370 (5160 Mdl 589), Personal Computer/AT (5170), Personal Computer/AT 370 (5170 Mdl 599 and 739), 3270 Personal Computer (5271--DOS 2.1/3.1/3.2, CP 1.2.2/2.1/3.0), 3270 Personal Computer/AT (5273--DOS 3.1/3.2; CP 1.2.2/2.1/3.0), 3270 Personal Computer/G and /GX (5371) 3270 AT/G and /GX (5373) and 3194 (Canada only > (except the mdl H50) <) with P/N 1525612, and compatible non-IBM hosts.

The 4202 adds high speed, wide carriage, desk-top, impact printing to the IBM Personal Computer family. Manual front sheet feed and continuous forms paper handling are integrated into the 4202, which is capable of handling downloadable print fonts (256 character), and is offered with a standard IBM Personal Computer compatible parallel interface, an optional asynchronous serial interface, and an optional 8K print buffer. The 4202 has a 13.6-inch print line, and will accept: continuous forms up to 15 inches in width; cut sheets up to 16.5 inches in width. Other features include - a user-friendly operator panel that lets the user choose many different print modes without the need for programming skills; support for proportional character spacing, software selectable margins and two high printing; approximately four million character ribbon life (DP mode); power-assisted paper loading for continuous forms; 4K standard print buffer; and "quiet" mode, a user-controlled feature that mutes the sound level while printing (10 cpi in DP mode).

The 4202 also includes a host independent self-test that demonstrates many of the print modes; this allows the printer to be demonstrated during self-test.

### MODEL

**Model 1 001:** Includes integrated tractor and friction forms feeding with integrated front sheet feed for cut sheets and envelopes.

**Limitations:** Continuous Forms: Pinfeed continuous forms can be used: Both edges of the pinfeed forms must be threaded through the tractor. No fasteners are permitted in the areas exposed to the printhead.

Printer Operation and print quality vary with paper and number of copies. Multipart forms should be tested in operating conditions to verify that results are satisfactory. The forms thickness lever must be varied to accommodate differing paper weight and thickness.

**Paper Specifications:** Maximum continuous forms paper width is 381mm (15 inches). Maximum print-line width is 345.4mm (13.6 inches).

**Front Sheetfeed:** Front sheetfeed is accomplished by hand insertion. One-part continuous feed paper can remain in the printer while you use cut forms or envelopes of the same or narrower width than the continuous forms.

**Paper Width:** Cut form: 76.2mm to 419.1mm (3 inches to 16.5 inches). Continuous Forms: 76.2mm to 419.1mm (3 inches to 15.0 inches).

Print standard envelopes:

Type	Size (inches)
No. 6 1/4	3 1/2 x 6
No. 6 3/4	3 5/8 x 6 1/2
No. 9	3 7/8 x 8 7/8
No. 10	4 1/8 x 9 1/2
No. 11	4 1/2 x 10 3/8
No. 12	4 3/4 x 11
No. 14	5 x 11 1/2

### Paper Weights:

#### Single part:

- 12-24 pound, 0.0023-inch to 0.0045-inch thickness \*

#### Multi-part:

- 1 to 3-part forms usage 10 to 15 pound paper \* (maximum 0.003-inch thickness)
- 4 part forms use 10 to 12 pound paper \* (maximum 0.003-inch thickness)
- For multi-part forms thickness must not exceed 0.014 inch (carbon)
- Carbonless forms...individual plies 0.0019 to 0.003-inch thick. Multiple part carbonless should not exceed 0.012-inch thickness.
- Paper over 24 pound must be tested for acceptable operation and legibility.

\*For 3-4 part carbonless forms and for paper weights less than 15 pounds the recommended maximum width is 241.3mm (9.5 inches). Multipart forms with fasteners along edges are not supported.

**Non-IBM Hosts:** The 4202 attaches to the following non-IBM PCs via the parallel or the serial interface and the appropriate attachment cable (Customer purchase and install). These non-IBM personal computers have been tested with the 4202 by IBM with the following results. This does not imply lack of compatibility with other non-IBM personal computers that may not have been tested.

PC	Degree of Compatibility	Modifications
Compaq Deskpro	Functionally compatible*	Parallel attachment without modification
Compaq Portable	Functionally compatible*	Parallel attachment without modification
AT&T (Mdl 6300)	Functionally compatible*	Serial attachment without modification Parallel attachment without modification
Apple IIE	Full text**	Serial attachment
Apple IIC	No graphic	Apple cable DP print mode only

\*These non-IBM computers were tested with the 4202 using IBM's version of the parallel interface or asynchronous serial interface. The 4202 was tested using the appropriate attachment cables. This test was done using selected popular application software packages typically available for the specific non-IBM computers being tested. There were no problems noted that were attributed to interface differences. The printer output prepared with the 4202 attached to these non-IBM computers operating with IBM PC DOS and using selected application programs was comparable to the printer output of runs with the IBM Personal Computer.

\*\*These non-IBM computers were tested with the 4202 using IBM's version of the asynchronous serial interface and the appropriate non-IBM cable. Text printing resulting from attachment of the 4202 to these non-IBM computers, using typical Apple software applications was comparable to text printing resulting from the attachment of the 4202 to IBM Personal Computers using typical IBM-compatible application programs.

To insure satisfactory results the user must test the specific printer, computer and software combination against the desired results. The selection and testing of an IBM printer and any combination of non-IBM computers are the responsibilities of the IBM Authorized dealer and the user.

IBM makes no warranties, expressed or implied, including but not limited to, the warranty of merchantability and the implied warranty of fitness for a particular purpose with respect to the compatibility of IBM printers and non-IBM computers using any particular software applications.

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**Customer Setup (CSU):** The 4202 is designated a customer setup machine. The marketing representative must advise the customer of his/her responsibilities before receipt of the machine. Customer setup instructions are included in the "IBM Proprinter XL Guide to Operations".

## HIGHLIGHTS

- Wide carriage printing (13.6-inch maximum print line)
- User friendly operator panel allowing selection of
  - Near Letter Quality printing
  - 12 CPI printing
  - Condensed printing
  - Emphasized printing
  - Double high printing
  - Double wide printing
  - Proportional character spacing
  - Quiet Mode
  - Audible alarm on/off
- Multiple speed serial impact printing
  - 200 cps DP Printing
  - 100 cps Emphasized Printing
  - 40 cps Near Letter Quality Printing
- Integrated front sheet feed for envelopes, cut sheet, etc.
- 256 character downloadable font capability
- Proportional character spacing
- Power-assisted paper loading
- Quiet mode
- Document on demand - tractors below print line
- Up to 4-part forms (original plus 3 parts)
- "Clean Hands" ribbon cartridge with approximately 4 million character life
- Integrated tractor and friction feed
- APA (All Points Addressable) graphics
- Printer selectable line spacing 1/6, 1/8, 7/72, N/72, N/216\*

\*Printer recognizes n/216 inch spacing commands; the smallest individual line increment is 1/144 with corrections made every third print line to obtain apparent n/216 spacing.

- 76.2mm (3 inches) to 419.1mm (16.5 inches) wide paper can be used with the front sheet feed
- 88.9mm (3 inches) to 381.0mm (15 inches) wide paper can be used with the continuous forms feed
- Bottom of forms printing - within 12.7mm (0.5 inches) of the bottom of a cut form
- IBM PC compatible parallel interface (standard)
- Optional asynchronous serial interface module - customer purchase and set-up
- Optional 8K print buffer - customer purchase and set-up

**Note:** The Proprinter 5K print buffer functions as an 8K print buffer in the 4202.

## Physical Specifications:

Width - 574.0mm (22.6 inches)  
Depth - 363.2mm (14.3 inches)  
Height - 133.4mm (5.25 inches)  
Weight - 9kg (23.6 pounds)

**Publications:** Translated publications are available for the following:

Canada French  
Denmark  
France/Belgium Fr.  
Germany/Austria  
Italy  
Netherlands/Belgium Dutch  
Norway  
Spain  
Sweden  
US/UK

## Hardware Maintenance Service:

Language	Order Item Number	Feature Code
English (US)	64X7618	#7618
French	64X7620	#7620
German	64X7619	#7619
Italian	64X7621	#7621
Spanish	64X7622	#7622

## Guide-To-Operations:

Language	Order Item Number	Feature Code
Belgium Dutch	64X7616	#7616
Belgium French	64X7615	#7615
Canadian French	64X7605	#7605
Danish	64X7611	#7611
English (UK)	64X7617	#7617
English (US)	64X7604	#7604
French	64X7607	#7607
German	64X7606	#7606
Italian	64X7608	#7608
Netherlands	64X7610	#7610
Norwegian	64X7612	#7612
Spanish	64X7609	#7609
Swedish	64X7613	#7613

## Technical Reference:

Language	Order Item Number	Feature Code
English (US)	64X7625	#7625

## SPECIFY

No specify.

- (Canada only) > Voltage (120V AC, 1-phase, 60 Hz). No specify required. Standard power cord is 1.8m (6 ft.). <
- Power (100/120/200/220/230/240V AC, 1 phase, 50/60 HZ. No specify required.
- A 2.8m (9.2 ft) power cord is supplied with the machine. The country will select a power cord plug to the specifications

most commonly used in that country. See configurations for order information.

- Color: Pearl white only (no specify required).

**SPECIAL FEATURES**

Asynchronous serial interface P/N 6493187, AAS #3000.

8K print buffer P/N 6493188, AAS #4000.

**MODEL CONVERSIONS (NONE)**

**ACCESSORIES**

Attachment cable (required to cable connect the 4202 to the host). Specify P/N 1525612 (#5612) for parallel attachment (1.8m/6 ft); P/N 8509386 (#6031) for serial attachment (6m/19.5 ft).

**SUPPLIES**

**Ribbons:** The 4202 black fabric ribbon (P/N 1040150) or equivalent. None required with machine order.

## 4207 PROPRINTER X24

### PURPOSE

The 4207 Proprinter X24 is a narrow-carriage high-speed, 24-wire serial dot-matrix impact letter quality printer for attachment to IBM Personal Computers, certain IBM Display Stations, and compatible non-IBM PC hosts. The 4207 Proprinter X24 will provide letter quality printing and high-resolution graphics in addition to all the print functions of the IBM Proprinter XL.

### MODELS

#### Model 001

#### Limitations:

- Continuous Forms: Both edges of the pinfeed forms must have pinfeed holes.
- Paper Specifications:
  - Maximum paper width is 11 inches
  - Maximum pin to pin width for continuous forms is 10 inches.
  - Maximum print-line width is 8.0 inches.
- Single Sheet feed: Single sheet is by manual front insertion, unless the sheetfeed is used.
- Sheetfeed Option:

#### Sheetfeed Option-Only Paper Characteristics:

- Paper Length: 5.5 in. (139.7 mm) to 14 in. (356 mm)
- Paper Weight: 16 lb. (60 g/sq m) to 24 lb. (90 g/sq m)
- Paper Width: 5.5 in. (139.7 mm) to 8.5 in. (216 mm)

#### Sheetfeed Option Physical Description:

- Height - 205mm (8 in.)
- Width - 323mm (12.7 in.)
- Depth - 230mm (9.1 in.)
- Weight - 5 lb.

Supply and Exit Bin Capacity: 100 sheets of 20 lb. (75 g/sq m) paper. (15-mm stack)

Typical Form Sizes: US/Canada (Type: 8.5" x 11" (P4) - 8.5" x 14" (legal); World Trade (Type: 8.24" x 11.69" (A4))

**Prerequisites:** For parallel attachment, the IBM PC Printer Attach Cable (P/N 1525612, #5612) is required and must be ordered separately.

**Customer Setup (CSU):** The 4207 Proprinter X24 is a customer setup (CSU) machine. The CSU allowance is one day. Detailed set-up instructions are included with each machine. Set-up service is available from the IBM National Service Division at IBM hourly rates and minimums.

### HIGHLIGHTS

- High Quality Printing
  - Letter quality text
  - High resolution, all points addressable (APA) graphics
  - Four resident type families: (sans serif, Courier 10, Prestige Elite-12, and Courier Proportional)
  - FontSet Option
- High Speed Printing
  - 67-80 cps burst speed in quality mode
  - 200-240 cps burst speed in draft mode
- Easy To Control Printing

- Operator panel selection of print modes
- User controlled quiet mode for DP printing
- Set up mode for selection of commonly used functions
- Pitch indicators
- Quiet mode indicator

#### ● Versatile Printing

- Variable pitches (5, 6, 8.55, 10, 12, 17.1 CPI and proportional)
- 6K standard print buffer
- 8.0 in. printing line
- Double high printing
- FontSet Option for additional type families

#### ● Versatile Paper Handling

- Continuous forms
  - ▲ Built-in variable width tractors
  - ▲ Document on demand (tear off page just printed)
  - ▲ Continuous forms up to 10 inches wide
  - ▲ Power assisted continuous forms loading
- Single sheets and forms
  - ▲ Convenient front cut sheet feed
  - ▲ Cut forms up to 11 inches wide
  - ▲ Standard friction feed
  - ▲ Sheetfeed Option

### DESCRIPTION

The printer is a new member of the Proprinter family and attaches to the IBM Personal Computers, to many compatible non-IBM personal computers, and to several IBM display stations. The printer offers two software or operator-selectable burst print speeds of 67-80 cps (Letter Quality) and 200-240 cps (Draft mode). Speed is dependent on the selected print mode and pitch. Both Draft and Letter Quality may be enhanced by double strike printing. Graphics and text modes may be alternately used in the same document.

The 4207 Proprinter X24 ribbon is a black fabric ribbon in a "clean hands" cartridge for easy installation. The ribbon is not the same as the ribbon used on the 9-wire Proprinters (4201 and 4202). A modified cartridge design prevents the installation of the 9-wire Proprinters' ribbons on the 4207 Proprinter X24.

Other enhancements include:

- This printer has four type families resident in the printer. Each type family is a group of typefaces that share a basic design, but vary in boldness and size. Over 50 typefaces are available.
- FontSet Option: will allow user-selected optional fonts to be placed in non-volatile memory.

The 4207 Proprinter X24 allows the user to choose among manually-fed cut sheets, continuous forms, or using the sheetfeed, automatically-fed cut sheets.

This printer attaches to the following:

- Personal Computer (5150)
- Portable Personal Computer (5155)
- Personal Computer XT (5160)
- Personal Computer XT Model 286 (5162)
- Personal Computer XT/370 (5160 Model 589)
- RT PC (6150 and 6151) (IBM 4201 Proprinter-only functions supported)
- Personal Computer AT (5170)
- Personal Computer AT/370 (5170 Models 599, 739, 919, 939)
- 3270 Personal Computer (5271) (IBM 3270 Workstation Program Version 1.0)
- 3270 Personal Computer AT (5273) (IBM 3270 Workstation Program Version 1.0)
- 3270-PC/G and GX (5371)

- 3270-PC AT/G and AT/GX (5373)
- PC Convertible
- System/2 Model 30 (8530)
- System/2 Model 50 (8550)
- System/2 Model 60 (8560)
- System/2 Model 80 (8580)

**Local Area Network Support:** The 4207 Proprinter X24 is compatible with the following hardware and software products:

- DOS 3.3
- PC Local Area Network Program Version 1.2
- IBM PC Network Protocol Driver Program
- IBM Local Area Network Support Program
- IBM Token-Ring Network PC Adapter
- IBM Token-Ring Network PC Adapter II
- IBM Token-Ring Network Adapter/A
- IBM PC Network Adapter II
- IBM PC Network Adapter II/A
- IBM System/2 Model 30 (8530)
- IBM System/2 Model 50 (8550)
- IBM System/2 Model 60 (8560)

3708 Network Conversion Unit (local attachment via the optional serial interface module).

The 4207 Proprinter X24 can be attached to an IBM 3708 Network Conversion Unit. The optional serial interface module must also be ordered for the 4207 Proprinter X24. The IBM 3708 Network Conversion Unit provides IBM 3270 protocol conversion and protocol enveloping for attaching the 4207 Proprinter X24, other Proprinters, and ASCII displays. Using the 4207 Proprinter X24 in this configuration provides a very effective low-cost solution to access IBM 3270 host applications. The 4207 Proprinter X24s attached to the IBM 3708 Network Conversion Unit are supported as an IBM 3287 Model 1 or 2. Printers are supported as an LU1 (SCS model) and/or LU3 (DSC model).

The PC/Host File Transfer and Terminal Emulator Program (6476052) 5875-MMA, 3708 feature code 0914 can be used with an IBM Personal Computer with the 4207 Proprinter X24 and attached to an IBM 3708 Network Conversion Unit. (Refer to Programming Announcement dated September 18, 1986).

**Token Ring LAN support:** The 4207 Proprinter X24 offers one-button selection of quality, pitch, font, and quiet mode. In addition the operator may use the printer Setup mode to select emphasized, double-high, double-wide, slashed zeroes, and reset the printer. The operator may also use the operator panel to print the status of the setup mode controllable options.

**Printer Options and Features:** The Printer attaches to the IBM Personal computer via an IBM PC Printer attach cable. Attachment to other than the IBM Personal Computer may require a different cable.

An optional sheetfeed is offered for the printer. This option permits convenient, automatic loading of cut sheets or letterhead with no additional software.

An optional FontSet is available. This option contains customer setup hardware, diskettes, and a Guide to Operations for downloading up to 11 additional type families. Each downloaded type family can be modified at the operator panel to print in several type faces. Also, this option allows the Printer to retain the downloaded font and operator panel settings in memory even when the printer has been turned off. This option will be offered in two versions:

1. P/N 94X6120: FontSet option (Diskettes, module, manual, module tool)
2. P/N 94X6121: FontSet diskettes, manual

An optional Asynchronous serial interface (identical to Proprinter and Proprinter XL) is also available.

**FontSet Option:** Each diskette (or diskettes) will contain the download utility and up to 11 font data files. All diskettes will be double-sided, available in 5.25-inch and 3.5-inch diskettes and will support DOS levels 2.0 and higher.

The FontSet option offers the following fonts:

The FontSet option will allow the user to place selected optional typefaces in non-volatile memory. This option will contain customer setup hardware, diskettes and a Guide to Operations for downloading up to 11 additional type styles. Each downloaded type family can be modified at the operator panel to print in several pitches. Also, this option allows the printer to retain the downloaded font and operator panel setting in memory. This option will be offered as follows:

- P/N 94x6120  
English version (Contains 32K RAM, Unplug tool, Guide to Operations, and two diskettes to provide 11 additional fonts)
- P/N 04F5185  
International version (contains 12K RAM, Unplug tool, Guide to Operations, NLS (code page 850) for Resident Fonts (two diskettes), and the International Font Option (code page 437 for 11 additional fonts- two diskettes; and code page 850 NLS for 11 additional fonts-two diskettes)
- Resident Fonts:  
Draft  
Courier 10  
Courier 12 Prestige Elite 12 Courier PS
- Additional Fonts:  
Artisan 10  
Boldface PS  
Boldface Italic PS  
Courier 10 Italic  
Courier 12  
Courier 12 Italic  
Courier PS Italic  
Letter Gothic 12  
Gothic 17  
Prestige Pica 10  
Title PS

## SPECIFY

- Voltage: 100V 60 Hz, 100-110V 50/60 Hz (P/N 94X6037), 115-120V 50/60 Hz (P/N 94X6038), 200-208V 50/60 Hz (P/N 94X6039), 220-240V 50/60 Hz (P/N 94X6041). No specify required.
- Cable Lengths (required to cable connect the 4207 Proprinter X24 to a Personal Computer). Cable length is 1.8m (6 ft). Order P/N 1525612 for personal computers.
- Color: Single color only (no specify required).

## SPECIAL FEATURES

	P/N	Feature Code #
Sheetfeed	87X9519	4927
PC Parallel Printer cable	1525612	5612
Serial Attach Module	6493187	3000
Serial Cable	8509386	6031
FontSet Option	94X6120	4001
FontSet Diskettes	94X6121	4002

## MACHINES

**M 4207.3**  
AUG 87  
NEW

### MODEL CONVERSIONS (NONE)

94X6060

Bangladesh  
Burma  
SriLanka

### ACCESSORIES

**Cable Order:** A PC Parallel Printer Cable (P/N 1525612) must be ordered separately to attach the 4207 Proprinter X24 to the parallel interface of the Personal Computer.

### SUPPLIES

- The 4207 Proprinter X24 Ribbon (P/N 1040475)
- The FontSet Module (P/N 94X6122)

### Part Numbers for Accessories/Features/Supplies

Machine: 4207 Proprinter X24

Ship Group  
P/N

### Countries

94X6057	Korea - with 94X6037 Philippines - with 94X6037 Taiwan - with 94X6037 Japan
94X6052	Philippines - with 94X6039 or 94X6041 Taiwan - with 94X6041 Thailand
94X6051	Afghanistan Indonesia Korea - with 94X6041 China (PRC)
94X6054	Brunei Malaysia Singapore India Hong Kong China (PRC)
94X6056	Australia New Zealand

### Description

### P/N

Features:	
IBM PC Parallel Attach Cable	1525612
Asynchronous Serial Attach Module	8509386
IBM PC Serial Attach Cable	8509386
4207 Proprinter X24 Sheetfeed:	
Canada	87X9519
Canada French	87X9522
AG-APG 1/2/4/6/7/9/11/12	87X9525
AG-APG 3/5/8/10/13/15	87X9528

FontSet Option:	
US and Canada	94X6120

Supplies:	
4207 Proprinter X24 Ribbon	1040475

### Publications:

- IBM 4207 Proprinter X24/IBM 4208 Proprinter XL24 Guide to Operations
  - US English (P/N 94X5832)
  - French Canadian
  - Spanish
- IBM 4207 Proprinter X24/IBM 4208 Proprinter XL24 Hardware Maintenance & Service Manual
  - US English (SC31-3552) (P/N 87X9702)
- IBM 4207 Proprinter X24/IBM 4208 Proprinter XL24 Hardware Maintenance & Service Manual Supplement
  - US English (SN31-8035) (P/N 94X5830)
- Proprinters Technical Reference Manual
  - US English (SC31-2587) (P/N 87X9703)
- Sheetfeed Guide to Operations
  - US English (P/N 87X9521)
  - French Canadian (P/N 87X9524)
  - Spanish (P/N 87X9542)

## 4208 PROPRINTER XL24

### PURPOSE

The 4208 Proprinter XL24 is a wide-carriage high-speed, 24-wire serial dot-matrix impact letter quality printer for attachment to IBM Personal Computers, certain IBM Display Stations, and compatible non-IBM PC hosts. The 4208 Proprinter XL24 will provide letter quality printing and high-resolution graphics in addition to all the print functions of the IBM Proprinter XL.

### MODELS

#### Model 001

#### Limitations:

- Continuous Forms: Both edges of the pinfeed forms must have pinfeed holes.
- Paper Specifications:
  - Maximum paper width is 419.1mm (16.5 in.)
  - Maximum pin-to-pin width for continuous forms is 381mm (15.0 in.)
  - Maximum print-line width is 335mm (13.6 in.)
- Single Sheet feed: Single sheet is by manual front insertion, unless the sheetfeed is used.
- Sheetfeed Option:

#### Sheetfeed Option-Only Paper Characteristics:

- Paper Length: 139.7mm (5.5 in.) to 356mm (14 in.)
- Paper Weight: 60g/sq.m (16 lb.) to 90g/sq.m (24 lb.)
- Paper Width: 139.7mm (5.5 in.) to 356mm (14.33 in.)

#### Sheetfeed Option Physical Description:

- Height: 205mm (8 in.)
- Width: 477mm (18.8 in.)
- Depth: 230mm (9.1 in.)
- Weight: 5 lb.

Supply and Exit Bin Capacity: 100 sheets of 75 g/sq.m (20 lb.) paper (15mm stack)

Typical Form Sizes: US/Canada (Type: 8.5" x 11" (P4) - 8.5" x 14" (legal); World Trade (Type: 8.24" x 11.69" (A4))

**Prerequisites:** For parallel attachment, the IBM PC Printer Attach Cable (P/N 1525612, #5612) is required and must be ordered separately.

**Customer Setup (CSU):** The 4208 Proprinter XL24 is a customer setup (CSU) machine. Detailed setup instructions are included with each machine.

### HIGHLIGHTS

- High Quality Printing:
  - Letter quality text
  - High resolution, all points addressable (APA) graphics
  - Four resident type families: Sans serif, Courier 10, Prestige Elite-12, and Courier Proportional
  - FontSet Option
- High Speed Printing:
  - 67-80 cps burst speed in quality mode
  - 200-240 cps burst speed in draft mode
- Easy To Control Printing:
  - Operator panel selection of print modes

- User controlled quiet mode for DP printing
- Setup mode for selection of commonly used functions
- Pitch indicators
- Quiet mode indicator

#### ● Versatile Printing:

- Variable pitches (5, 6, 8.55, 10, 12, 17.1 CPI and proportional)
- 6K standard print buffer
- 13.6-inch printing line
- Double-high printing
- FontSet Option for additional type families

#### ● Versatile Paper Handling:

- Continuous forms:
  - ▲ Built-in variable width tractors
  - ▲ Document on demand (tear off page just printed)
  - ▲ Continuous forms up to 15 inches wide
  - ▲ Power assisted continuous forms loading
- Single sheets and forms:
  - ▲ Convenient front cut sheet feed
  - ▲ Cut forms up to 16.5 inches wide
  - ▲ Standard friction feed
  - ▲ Sheetfeed Option

### DESCRIPTION

The printer is a new member of the Proprinter family and attaches to the IBM Personal Computers, to many compatible non-IBM personal computers, and to several IBM display stations. The printer offers two software or operator-selectable burst print speeds of 67-80 cps (Letter Quality) and 200-240 cps (Draft mode). Speed is dependent on the selected print mode and pitch. Both Draft and Letter Quality may be enhanced by double strike printing. Graphics and text modes may be alternately used in the same document.

The 4208 Proprinter XL24 ribbon is a black fabric ribbon in a 'clean hands' cartridge for easy installation. The ribbon is not the same as the ribbon used on the 9-wire Proprinters (4201 and 4202). A modified cartridge design prevents the installation of the 9-wire Proprinters' ribbons on the 4208 Proprinter XL24.

Other enhancements include:

- This printer has four type families resident in the printer. Each type family is a group of typefaces that share a basic design, but vary in boldness and size. Over 50 typefaces are available.
- FontSet Option: Will allow user-selected optional fonts to be placed in non-volatile memory.

The 4208 Proprinter XL24 allows the user to choose among manually-fed cut sheets, continuous forms, or using the sheetfeed, automatically-fed cut sheets.

This printer attaches to the following:

- Personal Computer (5150)
- Portable Personal Computer (5155)
- Personal Computer XT(TM) (5160)
- Personal Computer XT Model 286 (5162)
- Personal Computer XT/370 (5160 Model 589)
- RT PC (6150 and 6151) (IBM 4201 Proprinter-only functions supported)
- Personal Computer AT(R) (5170)
- Personal Computer AT/370 (5170 Models 599, 739, 919, 939)
- 3270 Personal Computer (5271) (IBM 3270 Workstation Program Version 1.0)
- 3270 Personal Computer AT (5273) (IBM 3270 Workstation Program Version 1.0)
- 3270-PC/G and GX (5371)
- 3270-PC AT/G and AT/GX (5373)
- PC Convertible

- IBM System/2 Model 30 (8530)
- IBM System/2 Model 50 (8550)
- IBM System/2 Model 60 (8560)
- IBM System/2 Model 80 (8580)

**Local Area Network Support:** The 4208 Proprinter XL24 is compatible with the following hardware and software products:

- DOS 3.30
- PC Local Area Network Program Version 1.2
- IBM PC Network Protocol Driver Program
- IBM Local Area Network Support Program
- IBM Token-Ring Network PC Adapter
- IBM Token-Ring Network PC Adapter II
- IBM Token-Ring Network Adapter/A
- IBM PC Network Adapter II
- IBM PC Network Adapter II/A
- IBM System/2 Model 30 (8530)
- IBM System/2 Model 50 (8550)
- IBM System/2 Model 60 (8560)

3708 Network Conversion Unit (local attachment via the optional serial interface module).

The 4208 Proprinter XL24 can be attached to an IBM 3708 Network Conversion Unit. The optional serial interface module must also be ordered for the 4208 Proprinter XL24. The 3708 Network Conversion Unit provides 3270 protocol conversion and protocol enveloping for attaching the 4208 Proprinter XL24, other Proprinters, and ASCII displays. Using the 4208 Proprinter XL24 in this configuration provides a very effective low-cost solution to access 3270 host applications. The 4208 Proprinter XL24's attached to the 3708 Network Conversion Unit are supported as an 3287 Model 1 or 2. Printers are supported as an LU1 (SCS model) and/or LU3 (DSC model).

The PC/Host File Transfer and Terminal Emulator Program (P/N 6476052) 5875-MMA, 3708 feature code #0914 can be used with an IBM Personal Computer with the 4208 Proprinter XL24 and attached to an 3708 Network Conversion Unit. (Refer to Programming Announcement September 18, 1986).

**Token-Ring LAN support:** The 4208 Proprinter XL24 offers one-button selection of quality, pitch, font, and quiet mode. In addition the operator may use the printer Setup mode to select emphasized, double-high, double-wide, slashed zeroes, and reset the printer. The operator may also use the operator panel to print the status of the setup mode controllable options.

**Printer Options and Features:** The Printer attaches to the IBM Personal computer via an IBM PC Printer attach cable. Attachment to other than the IBM Personal Computer may require a different cable.

An optional sheetfeed is offered for the printer. This option permits convenient, automatic loading of cut sheets or letterhead with no additional software.

An optional FontSet is available.

This option will contain customer setup hardware, diskettes, and a "Guide to Operations" for downloading up to 11 additional type families. Each downloaded type family can be modified at the operator panel to print in several type faces. Also, this option allows the Printer to retain the downloaded font and operator panel settings in memory even when the printer has been turned off. This option will be offered in two versions:

1. P/N 94X6120: FontSet Option (Diskettes, module, manual, module tool)
2. P/N 94X6121: FontSet diskettes, manual

An optional Asynchronous serial interface (identical to Proprinter and Proprinter XL) is also available.

**FontSet Option:** Each diskette (or diskettes) will contain the download utility and up to 11 font data files. All diskettes will be

double-sided, available in 5.25-inch and 3.5-inch diskettes and will support DOS levels 2.0 and higher.

The FontSet Option will allow the user to place selected optional typefaces in non-volatile memory. This option will contain customer setup hardware, diskettes, and a Guide to Operations for downloading up to 11 additional type styles. Each download type family can be modified at the operator panel to print in several pitches. Also, this option allows the printer to retain the downloaded font and operator panel setting in memory. The following option versions will be offered.

The English version (P/N 94X6120) contains 32K RAM, Unplug tool, the Guide to Operations, and 2 diskettes to provide 11 additional fonts.

The International version (P/N 04F5185) contains 32K RAM, Unplug tool, Guide to Operations, NLS (code page 850) for Resident Fonts (2 diskettes), and the International Font Option (code page 437) for 11 additional fonts (2 diskettes) and code page 850 NLS for 11 additional fonts (2 diskettes).

The FontSet option offers the following fonts:

#### Character Set:

- IBM PC International Character Set--NLS:
  - Code Page: 850
  - 3.5-inch Diskette P/N 94X6208
  - 5.25-inch Diskette P/N 94X6201
  - Total Fonts: 5 (Draft, Courier 10, Courier 12, Prestige Elite 12, Courier PS)
- IBM PC Multilingual Character Set--FontSet Option
  - Code Page: 437
  - 3.5-inch Diskette P/N 94X6169
  - 5.25-inch Diskette P/N 94X6168
  - Total Fonts: 11 (Artisan 10, Boldface PS, Boldface Italic PS, Courier 10 Italic, Courier 12, Courier 12 Italic, Courier PS Italic, Letter Gothic 12, Gothic 17, Prestige Pica 10, Title PS)

#### SPECIFY

- Power: 100V 60 Hz, 100-110V 50/60 Hz (P/N 94X5837), 115-120V 50/60 Hz (P/N 94X5847), 200-208V 50/60 Hz (P/N 94X5852), 220-240V 50/60 Hz (P/N 94X5856).
- Cable Lengths (required to cable connect the 4208 Proprinter XL24 to a Personal Computer). Cable length is 1.8m (6 ft). Order P/N 1525612 for personal computers.
- Color: Single color only (no specify required).

#### SPECIAL FEATURES

**Sheetfeed (87X9520, #4928).**

**PC Parallel Printer Cable (1525612, #5612).**

**Serial Attach Module (6493187, #3000)**

**Serial Cable (8509386, #6031)**

**FontSet Option (94X6120, #4001)**

**FontSet Diskettes (94X6121, #4002)**

**Cable Order:** A PC Parallel Printer Cable (P/N 1525612) must be ordered separately to attach the 4208 Proprinter XL24 to the parallel interface of the Personal Computer.

## MACHINES

**MODEL CONVERSIONS (NONE)**

94X5868

Bangladesh  
Burma  
Sri Lanka

**ACCESSORIES (NONE)**

## SUPPLIES

- The 4208 Proprinter XL24 Ribbon (P/N 1040414)
- The FontSet Module (P/N 94X6122)

**Part Numbers for Accessories/Features/Supplies**

Machine: 4208 Proprinter XL24:

Ship Group P/N	Countries
94X5842	Korea - with 94X5837 Philippines - with 94X5837 Taiwan - with 94X5837 Japan
94X5862	Philippines - with 94X5852 or 94X5856 Taiwan - with 94X5856 Thailand
94X5839	Afghanistan Indonesia Korea - with 94X5856 China (PRC)
94X5871	Brunei Malaysia Singapore India Hong Kong China (PRC)
94X5951	Australia New Zealand

## Description

P/N

<b>Features:</b>	
IBM PC Parallel Attach Cable	1525612
Async. Serial Attach Module	8509386
IBM PC Serial Attach Cable	8509386
4208 Proprinter XL24 Sheetfeed	
Canadian English	87X9520
Canadian French	87X9523
AG-A/PG 1/2/4/6/7/9/11/12	87X9526
AG-A/PG 3/5/8/10/13/15	87X9529
FontSet Option:	
US and Canada	94X6120

**Supplies:**  
4208 Proprinter XL24 Ribbon 1040414

## Publications:

- IBM 4208 Proprinter XL24/IBM 4207 Proprinter X24 Guide to Operations:
  - US English (P/N 94X5832)
  - French Canadian
  - Spanish
- IBM 4208 Proprinter XL24/IBM 4207 Proprinter X24 Hardware Maintenance and Service Manual:
  - US English (SC31-3552) (P/N 87X9702)
- IBM 4208 Proprinter XL24/IBM 4207 Proprinter X24 Hardware Maintenance and Service Manual Supplement:
  - US English (SN31-8035) (P/N 94X5830)
- Proprinters Technical Reference Manual:
  - US English (SC31-2587) (P/N 87X9703)
- Sheetfeed Guide to Operations:
  - US English (P/N 87X9521)
  - French Canadian (P/N 87X9524)
  - Spanish (P/N 87X9542)

## 4210 PRINTER

### PURPOSE

The 4210 Printer is a 200 cps serial dot matrix impact printer for local and remote attachment to System/36 and System/38. Three print quality modes are standard including NLQ (near letter quality) at 40 cps. The 4210 is designed for light-duty non-graphic printing applications.

### MODELS

#### Model 1 001

#### Limitations:

1. Use of pre-printed forms is not recommended, unless thoroughly tested, because of possible print registration errors.
2. The LAC (Load Alternate Characters), SCS Transparency, and the ASCII Transparency commands are not supported.
3. Unattended operation is not recommended.
4. Under certain conditions (e.g. a power loss to the printer during printing, or a printer "machine check"), there is a potential for the data loss not being communicated to the host.
5. A Cancel command from the host cannot clear the print buffer and may result in the printing of unwanted data.

#### Prerequisites

Attachment	Requirement
System/36 (5360, 5362, 5364)	An available Workstation Controller position. The System/36 SSP must be at Release 4 or higher.
System/38 (5381, 5382)	An available Workstation Controller position. The System/38 CPF must be at Release 7 or higher.
5294 Remote Control Unit	An available workstation position. (Remote attachment to System/36 with SSP at Release 4 or higher and System/38 with CPF at Release 7 or higher.)

**Note:** The 4210 must be defined as a 4214 Model 2 Printer.

**Customer Setup (CSU):** The 4210 is designated as a customer setup machine. Setup instructions are included with each machine.

### HIGHLIGHTS

- Rated print speeds of 200 cps for DP quality, 100 cps for Emphasized and 40 cps for NLQ (near letter quality).
- Vertical spacing: System/36 - 3, 4, 6, and 8 lines per inch; System/38 - 4, 6, 8, and 9 lines per inch.
- Horizontal spacing of 5, 10, 12, and 17.1 characters per inch.

- Multipart forms up to 4 parts (including original).
- Power-assisted paper loading for continuous forms.
- Program compatible with 4214 Printer function subset. (See Compatibility section.)
- Twinax attachment to System/36, System/38 and 5294 Remote Control Unit with cable-thru and termination standard.
- Ribbon cartridge allows "clean hands" removal and installation.

#### Physical Specifications:

Width - 574.0mm (22.6 in.)  
Depth - 363.2mm (14.3 in.)  
Height - 133.4mm (5.25 in.)  
Weight - 11.3 kg (25 lbs.)

#### Operating Environment:

Temperature - 10 to 41 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 (percent)

#### Publications:

- SC31-3782 Description, Programming, and Operations Kit (Includes SC31-3783 and SC31-3784)
- SC31-3783 Guide to Operations
- SC31-3784 Product and Programming Description
- SC31-3785 Hardware Maintenance and Service Manual

### DESCRIPTION

The 4210 is a compact table top convenience printer utilizing serial dot matrix impact technology.

The print head consists of nine (9) wires arranged in a single vertical column. Each wire has a diameter of 0.28mm (0.011 in.).

#### Print Quality Modes

**DP Mode:** The character box is 9 dots high by 12 dots wide. The nominal DP character matrix is 7 dots high (0.098 in.) by 4 of 7 wide. Maximum character box height is 0.125 inches.

**Emphasized Mode:** The dot density is doubled horizontally compared to DP mode. The character box is 9 dots high by 24 dots wide. The nominal Emphasized character matrix is 7 dots high (0.098 in.) by 7 of 13 wide. Maximum character box height is 0.125 inches. Emphasized Mode is selectable from the Operator Panel only.

**NLQ Mode (Near Letter Quality):** The dot density is doubled both horizontally and vertically compared to DP mode. The character box is 18 dots high by 24 dots wide. The nominal NLQ character matrix is 13 dots high (0.098 in.) by 7 of 13 wide. Maximum character box height is 0.125 inches.

The 4210 will provide the following forms handling capabilities:

- Program controlled line spacing capability of 1/6 and 1/8 inches and incremental line spacing of n/72 inch increments.
- Horizontal positioning of characters is operator adjustable over a range of at least one full character width to allow for horizontal print alignment. With a print line length of 335.28mm (13.2 in.), the following number of characters per line is possible:

66 Characters at 5 cpi  
132 Characters at 10 cpi  
158 Characters at 12 cpi  
198 Characters at 15 cpi\*  
220 Characters at 16.7 cpi\*

\* Printing in these densities will be at 17.1 cpi. However, the number of characters printed on the line (MPP) will be adjusted for the cpi selected, as shown above.

- Printing capability within 12.7mm (0.5 in.) of the top and bottom of the form.
- Forms length for both continuous (length between folds) and cut forms is 76.2mm (3 in.) minimum to the maximum length specifiable by the printer data stream.
- Forms thickness is manually adjustable to allow continuous multipart and cut forms up to 4 plies (original + 3 copies) to be used. Use of pre-printed forms is not recommended.
- An easy to read guide to accurately position forms and first print position on forms both horizontally and vertically.
- Forms movement under control of host software support (e.g., description of page length and first print position).

#### Continuous Forms

- Continuous forms width from 76.2mm (3 in.) to 381.0mm (15 in.) with a maximum print line length of 335.28mm (13.2 in.).
- Manually adjustable width forms tractors that span the printer's width range of 76.2mm (3 inches) to 381.0mm (15 inches) are standard.
- Document on Demand capability, the convenience of removing a printed continuous form without wasting or disturbing the unprinted forms.
- Print within 12.7mm (0.5 inches) from the top and bottom edges of the form when printing Document on Demand applications.

#### Cut Forms/Cut Sheets

- Paper width from 76.2mm (3 inches) to 420.0mm (16.5 inches) with a maximum print line length of 335.28mm (13.2 inches).
- The ability to easily load cut sheets or cut form sets (single or multi-part forms) from the front of the printer.
- The ability to have single part continuous forms remain in the printer while cut sheets, cut forms, or envelopes are manually inserted for printing. The dimensions of the inserted material must be of the same width or narrower than the continuous form. The continuous forms still move through the printer.
- The ability to manually position the forms at a predetermined first line position which can be at the top of the form.

#### End-of-Forms Sensor

- The printer will detect end-of-forms when approximately 0.9 inches of paper remains and will continue to print to within 0.5 inches of the bottom of the page.

**Compatibility:** The 4210 is designed to attach to the System/36 or System/38 and maintain compatibility with the 4214 Printer in functionally similar areas where not precluded by mechanical differences. Major differences between the 4210 and 4214 are:

- The 4210 will not provide support for the Load Alternate Characters (LAC) command. As a result, the following programs are not supported:
  - S/36: Advanced Printer Function Program (5727-AP1/AP6); Business Graphics Utilities (5727-BG1/BG6)
  - S/38: Advanced Printer Function Utility (5714-UT2); Business Graphics Utility (5714-GP1) and GDDM
- The 4214 uses either 120 or 108 steps per inch, depending on paper feed mechanism, and uses a software algorithm to em-

ulate movement in 72nds of an inch. The 4210 provides movement in 72nds of an inch.

- The 4214 supports 5, 10, 12, 15 and 16.7 cpi. The 4210 supports character spacing of 5 cpi (double wide mode), 10, 12 and 17.1 cpi. If 15 or 16.7 cpi is selected on the 4210, character spacing will be at 17.1 cpi, however the number of characters printed will be related to the cpi selected.
- The 4214 supports NLQ in 10 or 12 cpi; the 4210 will print NLQ at 5 (Double wide), 10 and 12 cpi.
- The 4214 offers an Auto Sheet Feed (ASF) mechanism and supports the drawer selection parameters of the Page Presentation Media control. The 4210 does not support an ASF device and will ignore the drawer selection command.
- The selection of Near Letter Quality from the 4210 Operator Panel will override the last received data stream quality selection. A subsequent data stream quality selection will override the last Operator Panel quality selection.

**Cable Orders:** The 4210 is connected to the System/36, System/38, or 5294 via twinaxial cable or shielded twisted pair cable. For information on twinaxial cabling see the "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337. For information on twisted pair cabling see "IBM Cabling System - Planning and Installation Guide", GA27-3361.

The customer is responsible for ordering, installation and maintenance of these cables and their various parts. The attachment cables may be purchased from IBM or from a customer-selected source. When twinax cabling is ordered from IBM:

Twinax Cables For:	Assembled P/N	Bulk (No. Connectors) P/N
Indoor/outdoor	7362267	7362211 (note 1)
Plenum	7362062	7362061 (note 2,4)
Connectors	P/N	
Kit of two indoor /outdoor cable connectors	7362268	(note 1)
Kit of two plenum cable connectors	7362063	(note 2)
Cable to Cable Adapter	7362230	(note 3,4)
Insulation Tubing	483619	(note 4)
Twinaxial Station Protector	7361807	(note 5)

#### Notes:

1. The order must specify the desired length. One twinaxial connector kit, P/N 7362268, required for each cable. This is an indoor/outdoor cable. Two male connectors included.
2. The order must specify the desired length. One twinaxial connector kit, P/N 7362063, required for each cable. Two male connectors included.
3. Use to join two P/N 7362267 or P/N 7362262 cable assemblies together.
4. Must be used when connecting two Teflon covered cable assemblies P/N 7362062 together with adapter P/N 7362230.
5. The kit includes two protectors. One is required at the end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual twinaxial station protectors, P/N 7362426, are available for replacement purposes. The station protector is CSU.

## MACHINES

### SPECIFY

- (Canada only > Voltage (120V AC, 1-phase, 60 Hz); No specify required. Standard power cord is 1.8m (6 ft.). <)
- Power: 100/120/200/220/230/240V AC, 1-phase, 50/60 Hz. No Specify required.
- A 2.8m (9.2 ft) power cord is supplied with the machine. The Country will select a power cord plug to the specifications most commonly used in that country. (See configurations for order information.)

**National Languages:** The following languages are available and are selected by switch setting at time of installation:

Belgian/Dutch	German
Belgian/French	Greek
Brazilian	Dutch
US English	Arabic
Danish	Norwegian
UK English	Icelandic
Finnish	Hebrew
French	Turkish
Italian	Thai
Japanese (English)	Swedish
Japanese (Katakana)	Yugoslavian
Portugese	
Spanish	
Canadian/French	

In addition, the following language groups are selectable:

Multilingual      Cyrillic  
Latin 2

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES

The following supply item is available

- IBM 4202/4210 Ribbon Cartridge (One included with printer), P/N 1040150

Approximate life of 4 million characters (DP Mode).

The above ribbon yields are derived from IBM-conducted tests in DP Mode. Ribbon life experienced by the user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and paper quality.

**Ordering Information:** The Description, Programming and Operations Kit (the Product and Programming Description manual is

provided in English only) and the Operator Panel overlay are shipped in the language required for a particular country as determined by the Country Code. Exceptions, such as countries with 2 or more languages will require Specify features or special model numbers as explained below.

Language	Countries
Canadian/ French	Canada
English	Canada, Australia, New Zealand, Bahamas, Barbados, Jamaica, Philippines, Thailand, Netherlands Antilles, Taiwan, Malaysia, Singapore, Indonesia, Bermuda
Katakana	Japan
Spanish	Mexico, Guatemala, Honduras, Bolivia, Dominican Republic, El Salvador, Nicaragua, Ecuador, Argentina, Columbia, Paraguay, Venezuela, Uruguay, Panama, Costa Rica, Peru, Chile

Orders from Canada require a Specify feature for language as follows:

#2934 Canadian English  
#2935 Canadian French

### Translated Publications

Language	Title	P/N
Canadian French	Description, Programming and Operations Kit	88X5469
English	Description, Programming and Operations Kit Hardware Service and Maintenance	88X5526 88X5527
Japanese/ Katakana	Description, Programming and Operations Kit	88X5477
Spanish	Description, Programming and Operations Kit	88X5539

**4216 PERSONAL PAGEPRINTER****PURPOSE**

The 4216 Personal Pageprinter is a compact, table top, page printer capable of printing up to 6 pages per minute utilizing a laser/electrophotographic (EP) process. The 4216 is designed for use with the new IBM Personal Publishing System Solution Packages and attaches to the host systems through the IBM Personal Pageprinter Adapter and IBM Personal Pageprinter attachment cable. The new video interface is designed to allow the printer to be coupled with the host system, with a large portion of what is normally regarded as printer function residing in the IBM Personal Pageprinter Adapter. The IBM Personal Publishing System Application System Solution Packages provide the facilities to do compound document creation, editing and printing for the cross industry application known as "Desktop Publishing".

**MODELS****Model 020: Video Interface**

**Limitations:** The 4216 is capable of printing up to 6 pages per minute. However, the printer's performance depends on several things:

- 6 pages per minute excludes the first page print time of 25 sec.
- Host system and application (image/graphics content varies performance)
- Paper size (6 PPM is for letter or A4 size paper)
- The complexity of the page to be printed

The 4216 is capable of handling the following paper types and sizes:

1. Letter Size - 216 x 279mm (8.5 x 11 in.)
2. Legal Size - 216 x 356mm (8.5 x 14 in.)
3. Half Letter - 140 x 216mm (5.5 x 8.5 in.)
4. A4 - 210 x 297 mm
5. B5 - 182 x 257 mm
6. A5 - 148 x 210 mm
7. Envelopes - Manual
8. Transparencies - A4 or Letter (Manual) (similar to IBM Copy Transparency 1674107)
9. Xerographic Labels - Letter or A4 size (Manual only)

Envelopes, Labels and Transparencies should be tested by the customer for satisfactory results before purchasing large quantities.

For satisfactory feeding, envelopes should not be stored nor manually fed where the humidity exceeds 70% R.H.

Transparencies with white optical sensor stripes coated with silicon lubricant and transparencies intended for infrared copiers are not recommended.

Transparencies should be treated for de-static control.

Maximum envelope stacking: 25 in upper tray; 5 in lower tray

All papers placed in the printer should be new, unused and without packaging damage. To improve feed reliability all papers should be "fanned" before being placed into the input tray.

For best performance, xerographic paper should be used in the printer. Because of its special characteristics, xerographic paper usually works better than other types of paper. IBM Multi-System Paper is top quality xerographic paper.

Plain bond paper of one of the following compositions may also be used:

- No. 1 sulfite (100% chemical wood pulp)
- 25% cotton content
- 50% cotton content
- Paper made from recycled office paper

100% cotton content paper is not recommended for use in this printer because poor print quality may result and extended use may shorten the life of the cleaning unit or fuser assembly.

The 4216 is capable of automatically feeding, printing, and ejecting paper with weights of 60 - 90 g/m<sup>2</sup> (16 to 24 lbs). Printing on pre-printed forms should be tested by the customer for satisfactory results.

The printer feeds and aligns envelopes whose length, defined as the dimension parallel to the feed direction, ranges from a minimum of 187mm (7.36 in.) to a maximum of 250mm (9.84 in.), and whose width, defined as the dimension perpendicular to the feed direction, ranges from a minimum of 98.4mm (3.875 in.) to a maximum of 176mm (6.93 in.).

The composition and substance weight of envelopes which are fed are based on the same standards as for paper.

Refer to the "IBM Page Printers Paper Reference Booklet" (P/N 1686710, G544-3178) for additional paper characteristics.

**Prerequisites:** A IBM Personal Pageprinter attachment cable (P/N 01F1175) is required to attach the 4216 to the IBM Personal Publishing System. Refer to the "IBM Personal Publishing System" for additional information.

**Customer Setup (CSU):** The 4216 is designated as a customer setup (CSU) box. A customer "Guide-To-Operations Manual" is provided with this printer. CSU allowance is one day. IBM setup is available at the applicable IBM hourly service rate and terms.

**HIGHLIGHTS**

- Up to 6 pages per minute for letter size paper
- 300 x 300 DPI Resolution
- Video Interface standard
- Uses memory resident in the host
- Very Quiet (52 dBAI-printing; 48 dBAI-idling)
- 150 sheet single input drawer standard
- Two output trays for sequenced or unsequenced output
- Average expected usage is 1,000 pages per month
- The duty cycle\* specification is 3,000 pages per month
- Handles various paper sizes and weights
- Envelopes, Transparencies and Labels
- Initial set of Supplies included (Toner Cartridge, Photoconductor Kit)
- Memory, Printer Control Function, and Fonts are all resident in the host.

\* Duty cycle is defined as the maximum pages per month the printer can be run and still expect to meet product specifications. Refer to the "IBM Personal Publishing System" for additional information.

**DESCRIPTION**

The 4216 Personal Pageprinter is a compact, table top, page printer capable of printing up to 6 pages per minute utilizing a laser/electrophotographic (EP) process. It is capable of printing on various paper types and sizes with a high resolution dot matrix pattern. The 4216 provides an output device for the IBM Personal Publishing Systems. The 4216 is designed for attachment to the IBM Personal Publishing System host systems through the IBM Personal Pageprinter Adapter and IBM Personal Pageprinter attachment cable. The special serial video interface allows the printer to be coupled with the host system, with a large portion of what is normally

regarded as printer function residing in the IBM Personal Pageprinter Adapter.

The 4216 is designed for customer setup (CSU) and ease of use. The printer can communicate with the operator via the control panel LED display and indicators. The operator can control the printer via control panel push buttons. The control panel is used by the customer to verify printer operation and diagnose problems.

The operator can gain access to the mechanism for supplies changes via an access cover. The customer will be supplied information necessary to install, relocate, operate and determine when service is required.

#### Physical Specifications:

Width: 418mm (16.46 in.)

Depth: 449mm (17.68 in.)

Height: 212.5mm (8.37 in.)

Weight: The maximum weight of the printer ready for operation including all trays, consumables, but not including packing material, paper, documentation or font cartridge shall be 16kg (35 lbs.). The maximum weight of the printer packaged for shipping to the customer shall be 22.7kg (50 lbs.).

#### Operating Environment:

Temperature: 15.6 - 32.2 degrees C (60 to 90 degrees F)

Relative Humidity: 20 to 80%

Wet Bulb: 22.8 degrees C (73 degrees F)

**Publications:** The following publication is shipped with 4216 Personal Pageprinter.

- (P/N 00F5794) IBM Personal Pageprinter (4216-020) Guide To Operations Manual

The following publications will be available by 3Q87 from Mechanicsburg for a fee. To order, contact your IBM representative.

- (P/N 00F5794) IBM Personal Pageprinter (4216-020) Guide To Operations Kit
- (P/N 00F5793) IBM Personal Pageprinter (4216-020) Hardware Maintenance and Service Manual Kit
- IBM Personal Pageprinter (4216-020) HMS Vol. 1
- IBM Personal Pageprinter (4216-020) HMS Vol. 2
- IBM Personal Pageprinter (4216-020) Planning and Description Manual (Included with GTO)
- IBM Personal Pageprinter (4216-020) GTO

#### SPECIFY

- Voltage: 120V, 50/60 Hz, Single Phase. (IBM Personal Pageprinter (4216-020) Low Voltage (P/N 90X6300)). A 1.8m (5.9 ft) power cord with non-locking plug is included.

#### SPECIAL FEATURES (NONE)

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES (NONE)

#### SUPPLIES

- Toner Cartridge (6 per carton) (P/N 6190603)
- Photoconductor Unit Kit (P/N 6190604)
- Cleaning Unit Kit (P/N 6190605)
- Xerographic Paper - letter size (8 reams (4K sheets)) (P/N 7034548); legal size (8 reams (4K sheets)) (P/N 7034550)

## 4224 PRINTER

THERE IS MORE THAN ONE TEXT VERSION FOR THIS DOCUMENT

### PURPOSE

A serial dot matrix bidirectional impact printer for local and remote attachment to System/36 and System/38 for a variety of DP and WP applications. Multiple models offer speeds up to 400 CPS and color printing. Advanced print functions are implemented through the new Intelligent Printer Data Stream (IPDS).

### MODELS 101, 102, 1E2, 1C2

**Model 101:** 200 CPS maximum (64K Memory)

**Model 102:** 400 CPS maximum (64K Memory)

**Model 1E2:** 400 CPS maximum - Expanded storage (512K Memory)

**Model 1C2:** 400 CPS maximum - Color and expanded storage (512K Memory)

**Note:** All models of the 4224 are capable of graphics printing; however if use of System/36 Business Graphics Utilities (BGU), Licensed Program (5727-BG1) for 5360 and 5362 System Units and (5727-BG6) for 5364 System Units, or if use of System/38 Business Graphics Utility, Licensed Program (5714-GP1), or System/38 GDDM is anticipated, it is recommended that a Model 1E2 (or 1C2) be ordered initially.

### Prerequisites: Attachment/Requirement

System/36 (5360, 5362, 5364)

An available Workstation Controller position. The System/36 SSP must be at Release 4 or higher.

System/38 All Models

An available Workstation Controller-Extended position. The System/38 CPF must be at Release 8 or higher.

5294 Remote Control Unit

An available workstation position and Extended Function A (#3601). (Remote attachment to System/36 with SSP at Release 4 or higher, or to System/38 with CPS Release 8 or higher.)

**Customer Setup (CSU):** The 4224 is designated as a customer setup machine. Setup instructions are included with each machine.

### HIGHLIGHTS

#### Two basic print speeds:

- 200 CPS (9 wire head)
- 400 CPS (18 wire head)

#### Three print quality modes and maximum print speeds:

Mode	Model 101	Model 102, 1E2, 1C2
DP	200 CPS	400 CPS
DP TEXT	100 CPS	200 CPS
NLQ	50 CPS	100 CPS

See "Throughput Considerations"

#### Print quality mode descriptions:

**DP Mode** - The character box is 9 dots high x 10 dots wide. The nominal DP character matrix is 7 dots high (0.098 in.) x 4 of 7 wide. Maximum character box height is 0.126 inches.

**DP Text Mode** - The dot density is doubled horizontally compared to DP mode. The character box is 9 dots high x 20 dots wide. The nominal DP Text character matrix is 7 dots high (0.098 in.) x 7 of 13 wide. Maximum character box height is 0.126 inches.

**NLQ Mode (Near Letter Quality)** - The dot density is doubled both horizontally and vertically compared to DP mode. The character box is 18 dots high x 20 dots wide. The nominal NLQ character matrix is 12 dots high (0.091 in.) x 7 of 13 wide. Maximum character box height is 0.133 inches.

- Vertical spacing of 6 and 8 lines per inch.
- Horizontal spacing of 10, 12, and 15 characters per inch. A special proportional font is available in DP TEXT and NLQ resulting in an average spacing of 11.5 characters per inch. Machines with serial number XX-F0001 and later also have 16.7 characters per inch in DP Mode only.
- Color printing (Model 1C2) is 4 or 8 colors as determined by ribbon type: (A 4 Color Primary ribbon is supplied with Model 1C2)
  - Accent Colors (4 Color Primary Ribbon): Black, Red, Blue, Green.
  - Subtractive Colors (8 Color Process Ribbon): Black, Yellow, Red, Magenta (Pink), Blue, Cyan (Turquoise), Green, Brown.
  - Two print passes are required to print the subtractive colors red, blue, green, and brown.
- A special longer life black ribbon may be installed in the Model 1C2 and conveniently exchanged by the operator for a color ribbon when color printing is required.
- Advanced print functions supported through the new Intelligent Printer Data Stream (IPDS) include vector graphics, resident bar codes, OCR A & B, raster image, and electronic forms (overlays).
- Bar codes supported by the 4224 are: 3 of 9 Code, MSI, UPC-A, UPC-E, UPC-2 Digit Magazine, UPC-5 Digit Magazine, EAN-8, EAN-13, 2 of 5 Industrial, 2 of 5 Matrix, 2 of 5 Interleaved, EAN-2 Digit Add-on, and EAN-5 Digit Add-on.
- Word processing functions include proportional spacing, sub/super script, and various emphasis capabilities (software dependent). Print quality, e.g., NLQ, is operator selectable and may be overridden by software.
- Print line max of 13.2 inches. Paper width from 3 inches to 15 inches (continuous forms).
- Up to four-part continuous forms may be used. Some five- and six-part forms may function satisfactorily but are not warranted by IBM.
- Direct attachment to IBM System/36 and IBM System/38 and to an IBM 5294 communicating with an IBM System/36 or System/38.
- Graphics printing at 144 x 144 dots per inch.
- Three operator changeable "forms modules" provide paper handling flexibility for continuous forms, document on demand, and document insertion (see "Special Features").
- Front loading and straight paper path provides operator convenience, added reliability, and reduction of multipart form "shingling".
- Advanced jam detection checks for paper motion when using continuous forms (Continuous Forms Device and Document

on Demand). Paper skew and insertion errors are detected when using cut forms (Document Insertion Device).

- Ribbon cartridge allows "clean hands" removal and installation.
- Operator replaceable printhead improves machine availability.
- Multi-function operator panel includes 3 position digital display.
- Cable-thru and termination are standard for twinax attachments through the use of a T-Connector assembly (included).
- Compact table top design will fit a variety of commercially available printer tables and stands.
- National Languages: National languages are selected via the operator panel. Available selections are:

Austria/Germany  
Belgian  
Brazil  
Canadian French  
Denmark/Norway  
Finland/Sweden  
France  
International  
Italy  
Japan English  
Japan Katakana  
Portugal  
Spain  
Spanish Speaking  
United Kingdom  
USA/Canada

#### Physical Specifications:

Height: 267mm (10.5 in.)  
Width: 642mm (25.3 in.)  
Depth: 358mm (14.0 in.)  
Weight: 22.68 kg (50 lb.)

**System Attachment:** An interface card and twinaxial connector for direct attachment to the System/36 (5360, 5362, 5364) Workstation Controller, the System/38 Workstation Controller-Extended and the IBM 5294 Remote Control Unit (An available workstation position and Extended Function A (#3601) is required on the 5294) is included with the 4224. Cable-thru and termination are standard through the use of a T-Connector included with the 4224. The host System/36 SSP must be at Release 4 or higher, and the host System/38 CPF must be at Release 8 or higher.

**Compatibility Considerations:** The 4224 is generally compatible with the IBM 5224 Printer when attached to System/36 or System/38. There are minor differences described in the "4224 Printer Product and Programming Description Manual", GC31-2551, along with comparisons of Operator Panel functions between the 4224 and the 5224, 5256, and 4214 that should be reviewed.

**Throughput Considerations:** The overall throughput depends on the print mode, application program, system response time, and the type of print operation being done. Any print operation that requires multiple passes or a reduction of horizontal dot spacing causes a reduction in the throughput.

Some print operations that affect throughput are:

Heavy print patterns  
Line length (number of characters per line)  
Subtractive color printing  
Multiple colors on a single line  
Bold printing, double strike printing, and other types of emphasis  
Graphics printing

The 4224 uses an internal print management feature to guard against overheating the printhead due to the quantity of dots being

printed. During extended printing of dense lines (greater than 60% of possible character positions printed), this safe-guard may cause the print mechanism to slow down. The additional printing time, due to this slow down, lowers the overall throughput proportionally.

**Intelligent Printer Data Stream (IPDS):** IPDS is a structured field approach to management and control of printer processes and is designed to allow the presentation of text, raster images, vector graphics, bar codes and previously stored overlays at any point on a page. This structure allows data and commands to be sent to the device independently from the attachment protocol. This enables the same data stream to be used for printers attached by any method which supports transparent transmission of data.

IPDS commands within the data stream enable the host processor to control and manage the down loading of fonts, symbol sets, and stored objects, such as overlays and page segments. The printer can later use these stored objects to construct a printed page. IPDS can significantly reduce the load on the host processor and the number of characters transmitted to the printer in many advanced printing applications.

**System/36 Programming Support:** Programming support for the 4224 Printer is provided by Release 4.0 of the System/36 System Support Program (SSP) - Program Numbers 5727-SS1 (5360 and 5362) and 5727-SS6 (5364). In addition two (2) new System/36 PRPQs support advanced print functions and graphics:

PRPQ NAME: IPDS Advanced Function  
5360 & 5362 5364  
-----  
5799-CGK (P84094) 5799-CGL (P84095)

PRPQ NAME: IPDS Graphics/Text Merge  
5360 & 5362 5364  
-----  
5799-CGJ (P84096) 5799-CGP (P84097)

Most existing System/36 applications are supported on the 4224 printer with few or no changes required. The IBM System/36 Advanced Printer Function (APF) Licensed Program Product (5727-AP1, AP6) is not supported on the 4224 printer. Release 5.1 of the SSP and the IPDS Advanced Function PRPQ (P84094 or P84095) are required for support of 16.7 CPI.

The IPDS Advanced Functions PRPQ consists of subroutines that provide interfaces for use of IPDS functions from RPG, COBOL and Assembler. Functions include selection of printer options such as color and print quality, and printing bar codes and graphics.

The IPDS Graphics/Text Merge PRPQ provides support for merging an IPDS graphics file with a page prior to printing. Also included is a utility for printing an IPDS graphics file directly on the 4224. This utility is required for printing BGR graphs on the 4224.

IBM System/36 software support of the 4224 printer also includes:

- Operation Control Language (OCL) support of Lines Per Inch (LPI), quality selection (Near Letter Quality or the current operator selected 4224 default), and font selection.
- DisplayWrite/36 support of LPI, 3 levels of quality selection, font selection, bold printing, underscore, overstrike, subscript, superscript, justification and OCR A/B printing.

Refer to HONE for current and detailed PRPQ information.

**System/38 Programming Support:** The 4224 Printer is supported by IBM System/38 CPF (5714-SS1) Release 8. Software support includes Control Language (CL) support of lines per inch (lpi), quality selection, font selection including OCR fonts, and code page selection. Also included is DDS support of LPI, color designation, font selection including OCR fonts, bold printing, underscore, expanded characters, bar codes and code page selection.

Most existing applications are supported on the 4224 with few or no changes required. The System/38 Advanced Printer Function Utility (5714-UT2) is not supported on the 4224 Printer. System/38 Business Graphics Utility (5714-GP1) and GDDM printing is supported on the 4224 Printer.

## Customer Responsibilities:

- Adequate site and system preparation. See "IBM 4224 Planning and Site Preparation", GC31-3625.
- Ordering, installing, and maintaining cables.
- Receipt at the customer's receiving dock, unpacking, and placement of the 4224 printer.
- Physical setup, setting configuration options, printer checkout, installation of forms device, and cable connections.
- Using and following the problem determination procedures before calling for IBM service.
- Ordering and replacing a worn printhead and ensuring that a functional printhead is available for problem determination purposes.
- Contacting IBM service to make cable connection to IBM non-CSU units where customer access areas are not provided.
- Ordering and replacing the ribbon cartridge.

## Publications:

- Product & Programming Description (GC31-2551)
- Guide to Operations (GC31-3621)
- Operating Instructions (GC31-2546)
- Planning & Site Preparation (GC31-3625)
- Setup Instructions (GC31-3607)
- Maintenance Information (SC31-3541)
- Parts Catalog (SC31-3542)
- Intelligent Printer Data Stream (IPDS); Reference Manual (S544-3417)\*

A special information binder is available, "4224 Printer Planning and Description Information", GC31-3605, which contains two key planning manuals conveniently packaged for presentation to customers:

- Planning and Site Preparation Manual (GC31-3625)
- Product and Programming Description Manual (GC31-2551)

Also see "KWIC Index", GA20-1621, and specific system bibliography.

\* Planned availability is third quarter 1986.

## SPECIFY

- Machines for AG-A/PG countries may either require low voltage (100 to 127V, 50/60 Hz, 1 phase) or high voltage (200 to 240V, 50/60 Hz, 1 phase) power supplies.
- When both low and high voltage machines are required in a particular country a specify feature must be used as follows:
  - #9200 for Low Voltage-120V (100V to 127V)
  - #9201 for High Voltage-220V (200V to 240V)
- The specific non-locking power plug is automatically selected by the Country Code of the order. A 2.8m (9 ft) power cord is provided. For Japan, specify type of power plug: #9250 for Non-locking, #9251 for Locking.

## Forms Device:

- Specify one (only) at time of machine order
- Specify #9501 for Continuous Forms Device (#4001), or
- Specify #9502 for Document on Demand (#4002), or
- Specify #9503 for Document Insertion Device (#4003)
- See description of forms devices under "Special Features"

Also see "Ordering Information".

## SPECIAL FEATURES

See "SPECIFY" for selection of one (1) forms device at time of machine order.

Additional forms devices must be ordered as Special Features. See (#4001, #4002, and #4003) below.

See "Product and Programming Description Manual" (GC31-2551), for form specifications and design information.

**Continuous Forms Device (#4001):** Provides an operator changeable "drop in" mechanism optimized for handling continuous forms. The right hand tractor is adjustable to accommodate forms width from 3 inches to 15 inches. Forms length can be from 3 inches to 14 inches. Up to six (6) part continuous forms may be used, however, for optimum feeding and stacking a maximum of four (4) parts is recommended. Limitations: Five (5) and six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Forms less than 6 inches in length or width and forms greater than 12.5 inches in length should be tested for satisfactory stacking. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4002 and #4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Document on Demand (#4002):** Provides an operator changeable "drop in" mechanism for handling continuous forms. For applications requiring removal (tear off) of the individual printed form without feeding a blank form or waiting for another form to print. The right hand tractor and feed rolls are adjustable to accommodate forms width from 3 inches to 15 inches. Forms length can be from 3 inches to 14 inches. Up to six (6) part continuous forms may be used, however, for optimum feeding and stacking a maximum of four (4) parts is recommended. Limitations: Not for Model 1C2. Five (5) and six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Forms less than 6 inches in length or width and forms greater than 12.5 inches in length should be tested for satisfactory stacking. Applications requiring more than 6 forms to be fed before separation (tear off) should be tested for satisfactory operation. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4001 and #4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Document Insertion Device (#4003):** Provides an operator changeable "drop in" mechanism to handle individually inserted forms. Includes a snap on guide for the left edge of the form. The right hand set of feed rolls is adjustable to accommodate forms width from 3 inches to 15 inches. Forms length can be from 7 inches to 14 inches. Limitations: Not for Model 1C2. Forms over 13 inches wide should be tested for satisfactory feeding and registration. Two (2) to six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Multipart form sets must not be fastened with staples, and must be glued only at the top edge securely enough to prevent form separation while passing through the printer. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4001 and #4002). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

## MODEL CONVERSIONS

Field conversions can be made from Model 102 to Model 1E2. No other conversions are possible. Not Customer Setup.

**Note:** All models of the 4224 are capable of graphics printing; however if use of System/36 Business Graphics Utilities (BGU), Licensed Program (5727-BG1) for 5360 and 5362 System Units and (5727-BG6) for 5364 System Units, or if use of System/38 Business Graphics Utility, Licensed Program (5714-GP1), or System/38 GDDM is anticipated, it is recommended that a Model 1E2 (or 1C2) be ordered initially.

**Cables:** The 4224 is connected to the System/36, System/38 or 5294 via twinaxial cable or shielded twisted pair cable. For information on twinaxial cabling see "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337. For information on twisted pair cabling see "IBM Cabling System-Planning and Installation Guide", GA27-3361.

The customer is responsible for ordering, installation and maintenance of these cables and their various parts. The attachment cables may be purchased from IBM or from a customer- selected source. When twinax cabling is ordered from IBM:

Philippines, Thailand,  
Netherlands Antilles,  
Taiwan, Malaysia,  
Singapore, Indonesia

Twinax Cables for:	Assembled P/N	Bulk (No Connectors) P/N
Indoor/ outdoor	7362267	7362211 (note 1)
Plenum	7362062	7362061 (note 2,4)

## Connectors

Kit of two indoor/ outdoor cable connectors	P/N 7362268 (note 1)
Kit of two plenum cable connectors	P/N 7362063 (note 2)
Cable to Cable Adapter	P/N 7362230 (note 3,4)
Insulation Tubing	P/N 483619 (note 4)
Twinaxial Station Protector	P/N 7361807 (note 5)

## Notes:

1. The order must specify the desired length. One twinaxial connector kit, P/N 7362268, required for each cable. This is an indoor/outdoor cable. Two male connectors included.
2. The order must specify the desired length. One twinaxial connector kit, P/N 7362063, required for each cable. Two male connectors included.
3. Use to join two 7362267 or 7362262 cable assemblies together.
4. Must be used when connecting two Teflon covered cable assemblies P/N 7362062 together with adapter P/N 7362230.
5. The kit includes two protectors. One is required at the end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual twinaxial station protectors, P/N 7362426, are available for replacement purposes. The station protector is CSU.

Order the above items via MES from Poughkeepsie.

**Ordering Information:** Operating Instructions, Guide to Operations, Setup Instructions, and the Operator Panel overlay are shipped in the language required for a particular country as determined by the Country Code. Exceptions, such as countries with 2 or more languages will require Specify features as explained below.

Language	Countries
Spanish	Mexico, Guatemala, Honduras, Bolivia, Dominican Republic, El Salvador, Nicaragua, Ecuador, Argentina, Columbia, Paraguay, Venezuela, Uruguay, Panama, Costa Rica, Peru, Chile
Canadian French	Canada
English	Canada, Australia, New Zealand, Bahamas, Barbados, Jamaica,

## Katakana

## Japan

Orders from Canada require a Specify feature for language as follows:

Specify #2934 for Canadian English  
Specify #2935 for Canadian French

Specify codes are required for the following Languages:

Specify #2808 for Thai

## Translated Publications:

Language	P/N
Canadian/French	
Setup Instructions	64X8697
Operating Instructions	64X8699
GTO (Guide to Operations)	64X8698
English	
Setup Instructions	64X8695
Operating Instructions	56X8377
GTO	64X8694
Spanish	
Setup Instructions	64X8702
Operating Instructions	56X8362
GTO	64X8703
Japanese/Katakana	
Setup Instructions	64X8704
Operating Instructions	64X8707
GTO	64X8705

## ACCESSORIES

**Forms Stand (#4450), (P/N 2526750):** Provides for stacking of continuous forms on a stand after printing.

## SUPPLIES

### Ribbon Cartridge

- P/N 6091849 Black - 14 mm (average 4 Million Char.) (Model 101,102,1E2)
- P/N 1040440 Black - 14 mm (average 6 Million Char.) (Model 101, 102, 1E2)
- P/N 6115549 Black - 27 mm (6 Million Char.) (Model 1C2 only)
- P/N 6115555 4 Color Primary (2.7 Million Char.) (Model 1C2 only)
- P/N 6115554 8 Color Process (2.7 Million Char.) (Model 1C2 only)

The above ribbon yields are derived from IBM conducted tests in DP Mode. Ribbon life experienced by the user may vary significantly depending on the users own quality criteria and on factors such as printer condition, machine settings, and paper quality.

Color ribbon yield was calculated as 1.2 million per black band plus 0.5 million for each of the three color bands.

### Printhead:

P/N 6091490 -- 9 Wire --- (Model 101 only)  
P/N 6091449 -- 18 Wire --- (Model 102, 1E2, 1C2)

The life expectancy of the 9 wire printhead is 125 million DP characters and 250 million for the 18 wire printhead. Printhead life ex-

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perenced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

## 4224 PRINTER

### PURPOSE

A serial dot matrix bidirectional impact printer for local attachment to Series/1 and System/88. Three levels of print quality combined with forms handling options and graphics capability makes the 4224 ideal for a variety of applications. Multiple models offer speeds up to 400 CPS and color printing. The Model 3C2 is not supported by System/88.

### MODELS 301, 302, 3C2

**Model 301:** 200 CPS maximum (64K Memory)

**Model 302:** 400 CPS maximum (64K Memory)

**Model 3C2:** 400 CPS maximum - Color (512K Memory)

### Prerequisites:

INTERFACE	SERIES/1 PROCESSOR FEATURES
RS-232-C or RS422-A	Multifunction Attachment (#1310)
RS-232-C	Feature Programmable 4-Line Adapter (#2095/2096)
	SYSTEM/88 PROCESSOR FEATURES
RS-232-C Local	Direct Connect Asynchronous Line Adapter (#1202)

**Customer Setup (CSU):** The 4224 is designated as a customer setup machine. Setup instructions are included with each machine.

### HIGHLIGHTS

- Two basic rated print speeds:

200 CPS (9 wire head)  
400 CPS (18 wire head)

- Three print quality modes and rated print speeds:

Mode	Model 301	Model 302 & 3C2
DP	200 CPS	400 CPS
DP TEXT	100 CPS	200 CPS
NLQ	50 CPS	100 CPS

See "Throughput Considerations"

- Print quality mode descriptions:

**DP Mode** - The character box is 9 dots high by 10 dots wide. The nominal DP character matrix is 7 dots high (0.098 in.) x 4 of 7 wide. Maximum character box height is 0.126 inches.

**DP Text Mode** - The dot density is doubled horizontally compared to DP mode. The character box is 9 dots high x 20 dots wide. The nominal DP Text character matrix is 7 dots high (0.098 in.) x 7 of 13 wide. Maximum character box height is 0.126 inches.

**NLQ Mode (Near Letter Quality)** - The dot density is doubled both horizontally and vertically compared to DP mode. The

character box is 18 dots high x 20 dots wide. The nominal NLQ character matrix is 12 dots high (0.091 inches) x 7 of 13 wide. Maximum character box height is 0.133 inches.

- Vertical spacing of 6 and 8 lines per inch.
- Horizontal spacing of 10, 12, and 15 characters per inch. A special proportional font is available in DP TEXT and NLQ resulting in an average spacing of 11.5 characters per inch. (Proportional font not available for PC Multilingual character set) Machines with serial number XX-F0001 and later also have 16.7 characters per inch in DP Mode only.
- Color printing (Model 3C2) is 4 or 8 colors as determined by ribbon type: (A 4-color Primary ribbon is supplied with Model 3C2)
  - Accent Colors (4-color Primary Ribbon): Black, red, blue, green.
  - Subtractive Colors (8 color Process Ribbon): Black, red, blue, green, yellow, magenta (pink), cyan (turquoise), brown.

Two print passes are required to print the subtractive colors red, blue, green, and brown.

- A special longer life black ribbon may be installed in the Model 3C2 and conveniently exchanged by the operator for a color ribbon when color printing is required.
- Bar codes supported by the 4224 are: 3 of 9 Code, MSI, UPC-A, UPC-E, UPC-2 Digit Magazine, UPC-5 Digit Magazine, EAN-8, EAN-13, 2 of 5 Industrial, 2 of 5 Matrix, 2 of 5 Interleaved, EAN-2 Digit Add-on, and EAN-5 Digit Add-on.
- Word processing functions include proportional spacing, sub/super script, and various emphasis capabilities (software dependent). Print quality, e.g., NLQ, is operator selectable and may be overridden by software.
- Print line max of 13.2 inches. Paper width from 3 inches to 15 inches (continuous forms).
- Multipart forms up to 6 parts (including original).
- Direct attachment to IBM Series/1 Processors (except 4950 and 5170 System Units) via either EIA RS-232-C or RS-422-A interfaces and to System/88 via the RS-232-C interface.
- Data transfer rates of 300, 600, 1200, 2400, 4800, 9600, and 19200 baud are operator selectable to match the system rate.
- Graphics printing at 144 x 144 dots per inch.
- Three operator changeable "forms modules" provide paper handling flexibility for continuous forms, document on demand, and document insertion. (See SPECIAL FEATURES).
- Front loading and straight paper path provides operator convenience, added reliability, and reduction of multipart form "shingling".
- Advanced jam detection checks for paper motion when using continuous forms (Continuous Forms Device and Document on Demand). Paper skew and insertion errors are detected when using cut forms (Document Insertion Device).
- Ribbon cartridge allows "clean hands" removal and installation.
- Operator replaceable printhead improves machine availability.
- Multi-function operator panel includes 3 position digital display.
- Compact table top design will fit a variety of commercially available printer tables and stands.

- National Languages: National languages (EBCDIC) are selected via the operator panel. Available selections are:

Austria/Germany  
Belgian  
Brazil  
Canadian French  
Denmark/Norway  
Finland/Sweden  
France  
International  
Italy  
Japan English  
Japan Katakana  
Portugal  
Spain  
Spanish Speaking  
UK  
US/Canada

#### Physical Specifications:

Height: 267mm (10.5 in.)  
Width: 642mm (25.3 in.)  
Depth: 358mm (14.0 in.)  
Weight: 22.68 kg (50 lb.)

**System Attachment:** Series/1 Attachment - Local: The 4224-301, 302, and 3C2 attach to the Series/1 Multifunction Attachment (#1310) and the Feature Programmable 4-Line Adapter (#2095/2096).

Series/1 Features	RS-232-C	RS-422-A
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#1310	X	X
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#2095/2096	X	
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XON/XOFF pacing must be used to ensure data transfer integrity.

**System/88 Attachment - Local:** The 4224-301 and 302 attach to the System/88 Direct Connect Asynchronous Line Adapter (#1202).

System/88 Features	RS-232-C
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#1202	X
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**Throughput Considerations:** The overall throughput depends on the print mode, application program, system response time, and the type of print operation being done. Any print operation that requires multiple passes or a reduction of horizontal dot spacing causes a reduction in the throughput.

Some print operations that affect throughput are:

- Heavy print patterns
- Line length (number of characters per line)
- Subtractive color printing
- Multiple colors on a single line
- Bold printing, double strike printing, and other types of emphasis
- Graphics printing

The 4224 uses an internal print management feature to guard against overheating the printhead due to the quantity of dots being printed. During extended printing of dense lines (greater than 60% of possible character positions printed), this safe-guard may cause the print mechanism to slow down. The additional printing time, due to this slow down, lowers the overall throughput proportionally.

**Programming Support:** Programming support for the IBM 4224 Models 301, 302, and 3C2 is provided by Series/1 Realtime Programming System (RPS) Version 7.2 and Event Driven Executive (EDX) Version 5.2.

**Event Driven Executive Version 5.2:** Support for the 4224 is provided through Event Driven Language (EDL) instructions preprocessed by a compiler and prepared for execution (linked) by system utilities.

At execution time the compiled instructions are processed by the Supervisor/Emulator.

The PRINTTEXT instruction is used to write data to the printer. The data may be an explicit text message to be printed or direct I/O control (data streaming mode) of the printer.

The XLATE=YES parameter causes translation of character codes from EBCDIC to ASCII.

The XLATE=NO parameter allows an application to send data stream controls directly to the 4224 without interpretation by the Supervisor/Emulator. This allows the application to send the advanced function graphics, overlays, and page segment controls defined in the the printer documentation.

The TERMCTRL instruction is used to request execution of special 4224 functions. TERMCTRL instructions are provided to:

- Print bar code
- Initialize or modify a font
- Down load printable images for specific code points
- Specify the new active font for subsequent printing
- Assign a specific character set to a font
- Delete a font from the printer storage
- Turn on and off continuous underscore mode
- Turn on and off continuous overscore mode
- Turn on and off italics mode
- Turn on and off double strike print mode
- Turn on and off double wide print mode
- Turn on and off bold (emphasized) print mode
- Turn on and off superscript or subscript print mode
- Specify the color of subsequent printing
- Specify print quality

**Emulation of 4975 on 4224:** A new System generation is required to add the 4224 printer to the operating system.

Applications must be re-linked to include a modified 4975 support module.

The Supervisor/Emulator intercepts and translates 4975 TERMCTRL instructions into 4224 instructions.

Recoding of applications is not required; however, the following differences apply:

The 4224 has a higher print density for DP Text and NLQ than the 4975.

The 4224 provides 10, 12 and 15, and 16.7 CPI (serial number XX-F0001 and later); the 4975 provides 10, 15 and 20 CPI.

Language selection on the 4224 is set offline as a configuration option.

The 4224 is a locally attached device only.

The DCB operand of the 4975 TERMCTRL instruction is not supported by the 4224 printer.

Utilities are available to set or change the state of the printer. Commands entered to execute 4224 utilities may differ from those for the 4975.

**Pacing:** Support is provided for XON/XOFF pacing at all baud rates using the RS-232 or RS-422 interface up to the maximum rates supported by the attachments.

**Realtime Programming System Version 7.2:** The 4224 printer is accessed using the WRITE macro:

Formatted WRITES are supported by the Print Spooler.

Formatted WRITES are intercepted by the 4224 Device Handler and transformed from the Series/1 Device Control Block into data stream controls (4975 like functions).

Unformatted WRITES are not supported by the Print Spooler.

Unformatted WRITES allow application generated data stream controls and text to be transmitted directly to the 4224 allowing

access to advanced function graphics, overlays, and page segment controls.

Support is provided for XON/XOFF data pacing at data rates up to 9600 baud with the asynchronous RS-422 interface via the Multi-function Attachment (#1310).

**System/88:** The 4224 Models 301 and 302 will be supported in the 4th Quarter 1986 with the then most current level of the System/88 Operating System (5732-001).

#### Customer Responsibilities:

- Adequate site and system preparation. See "IBM 4224 Planning and Site Preparation", GC31-3625.
- Ordering, installing, and maintaining cables.
- Receipt at the customer's receiving dock, unpacking, and placement of the 4224 printer.
- Physical setup, setting configuration options, printer checkout, installation of forms device, and cable connections.
- Using and following the problem determination procedures before calling for IBM service.
- Ordering and replacing a worn printhead and ensuring that a functional printhead is available for problem determination purposes.
- Contacting IBM service to make cable connection to IBM non-CSU units where customer access areas are not provided.
- Ordering and replacing the ribbon cartridge.

#### Publications:

- Product & Programming (ASCII) Description (GC31-2550)
- Guide to Operations (GC31-3621)
- Operating Instructions (GC31-2545)
- Planning & Site Preparation (GC31-3625)
- Setup Instructions (GC31-3607)
- Maintenance Information (SC31-3541)
- Parts Catalog (SC31-3542)

A special information binder is available, "4224 Printer Planning and Description Information", GC31-3706, which contains two key planning manuals conveniently packaged for presentation to customers:

- Planning and Site Preparation (GC31-3625)
- Product and Programming (ASCII) Description (GC31-2550)

Also see "KWIC Index", GA20-1621, and specific system bibliography.

#### SPECIFY

- Machines for AG-A/PG countries may either require low voltage (100 to 127V, 50/60 Hz, 1 phase) or high voltage (200 to 240V, 50/60 Hz, 1 phase) power supplies.
- When both low and high voltage machines are required in a particular country a specify feature must be used as follows:  
  - #9200 for Low Voltage-120V (100v to 127v)
  - #9201 for High Voltage-220V (200v to 240v)
- The specific non-locking power plug is automatically selected by the Country Code of the order. A 2.8m (9 ft) power cord is provided.

For Japan- specify type of power plug:

- #9250 for Non-locking
- #9251 for Locking

#### Forms Device:

Specify one (only) at time of machine order

Specify #9501 for Continuous Forms Device (#4001) or  
Specify #9502 for Document on Demand (#4002) or  
Specify #9503 for Document Insertion Device (#4003)  
See description of forms devices under SPECIAL FEATURES

Also see "Ordering Information".

#### SPECIAL FEATURES

See "SPECIFY" for selection of one (1) forms device at time of machine order.

Additional forms devices must be ordered as Special Features. See (#4001, #4002, and #4003) below.

See "Product and Programming (ASCII) Description Manual", GC31-2550, for form specifications and design information.

**Continuous Forms Device (#4001):** Provides an operator changeable "drop in" mechanism optimized for handling continuous forms. The right hand tractor is adjustable to accommodate forms width from 3 inches to 15 inches. Forms length can be from 3 inches to 14 inches. Up to six (6) part continuous forms may be used, however, for optimum feeding and stacking a maximum of four (4) parts is recommended. Limitations: Five (5) and six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Forms less than 6 inches in length or width and forms greater than 12.5 inches in length should be tested for satisfactory stacking. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4002 and #4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Document on Demand (#4002):** Provides an operator changeable "drop in" mechanism for handling continuous forms. For applications requiring removal (tear off) of the individual printed form without feeding a blank form or waiting for another form to print. The right hand tractor and feed rolls are adjustable to accommodate forms width from 3 inches to 15 inches. Forms length can be from 3 inches to 14 inches. Up to six (6) part continuous forms may be used, however, for optimum feeding and stacking a maximum of four (4) parts is recommended. Limitations: Not for Model 3C2. Five (5) and six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Forms less than 6 inches in length or width and forms greater than 12.5 inches in length should be tested for satisfactory stacking. Applications requiring more than 6 forms to be fed before separation (tear off) should be tested for satisfactory operation. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4001 and #4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Document Insertion Device (#4003):** Provides an operator changeable "drop in" mechanism to handle individually inserted forms. Includes a snap on guide for the left edge of the form. The right hand set of feed rolls is adjustable to accommodate forms width from 3 inches to 15 inches. Forms length can be from 7 inches to 14 inches. Limitations: Not for Model 3C2. Forms over 13 inches wide should be tested for satisfactory feeding and registration. Two (2) to six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Multipart form sets must not be fastened with staples, and must be glued only at the top edge securely enough to prevent form separation while passing through the printer. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4001 and #4002). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Cables - Series/1:** The 4224 may be attached to the Series/1 RS-232-C features using the Series/1 Asynchronous Local Attachment Communications Cable (#2056) in conjunction with EIA External Data Set Cable (P/N 5640736).

Attachment to the Series/1 RS-422-A features may be made using the 50 foot Series/1 Local RS-422 Cable (#5770).

IBM shielded twisted pair cable (or equivalent) may be used with the RS-422-A interface for distances up to 4,000 feet. This cable and associated accessories may be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

For proper identification, installation, and application of cable and associated accessories refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361 and/or "IBM Series/1 Customer Site Preparation Manual", GA34-0050. For pricing and ordering information, refer to the System Supplies operation within your country.

**Cables - System/88:** The 4224 may be attached to the System/88 communications adapters using Cables (#1802), (#1803), or (#1804) for direct connection to the RS-232-C interface.

### ORDERING INFORMATION

Operating Instructions, Guide to Operations, Setup Instructions, and the Operator Panel overlay are shipped in the language required for a particular country as determined by the Country Code. Exceptions, such as countries with 2 or more languages will require Specify features or special model numbers as explained below.

Language	Countries
Spanish	Mexico, Guatemala, Honduras, Bolivia, Dominican Republic, El Salvador, Nicaragua, Ecuador, Argentina, Columbia, Paraguay, Venezuela, Uruguay, Panama, Costa Rica, Peru, Chile
Canadian French	Canada
English	Canada, Australia, New Zealand, Bahamas, Barbados, Jamaica, Philippines, Thailand, Netherlands Antilles, Taiwan, Malaysia, Singapore, Indonesia, Bermuda
Katakana	Japan

Orders from Canada require a Specify feature for language as follows:

Specify #2934 for Canadian English  
Specify #2935 for Canadian French

### Translated Publications:

Language	P/N
Canadian/French	
Setup Instructions	64X8697
Operating Instructions	64X8701
GTO (Guide to Operations)	64X8698

English

Setup Instructions	64X8695
Operating Instructions	56X8376
GTO	64X8694
Spanish	
Setup Instructions	64X8702
Operating Instructions	56X8361
GTO	64X8703
Japanese/Katakana	
Setup Instructions	64X8704
Operating Instructions	64X8706
GTO	64X8705

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**Forms Stand (#4450), (P/N 2526750):** Provides for stacking of continuous forms on a stand after printing.

### SUPPLIES

#### ● Ribbon Cartridge:

- P/N 6091649 Black - 14 mm (average 4 Million Char.) (Model 301,302)
- P/N 1040440 Black - 14 mm (average 6 Million Char.) (Model 301,302)
- P/N 6115549 Black - 27 mm (6 Million Char.) (Model 3C2 only)
- P/N 6115555 4 Color Primary (2.7 Million Char.) (Model 3C2 only)
- P/N 6115554 8 Color Process (2.7 Million Char.) (Model 3C2 only)

The above ribbon yields are derived from IBM conducted tests in DP Mode. Ribbon life experienced by the user may vary significantly depending on the users own quality criteria and on factors such as printer condition, machine settings, and paper quality.

Color ribbon yield was calculated as 1.2 million per black band plus 0.5 million for each of the three color bands.

#### ● Printhead:

P/N 6091490 -- 9 Wire -- (Model 301 only)  
P/N 6091449 -- 18 Wire -- (Model 302, 3C2)

The life expectancy of the 9 wire printhead is 125 million DP characters and 250 million for the 18 wire printhead. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

## 4224 PRINTER

### PURPOSE

A serial dot matrix bidirectional impact printer for attachment to 3174/3274/3276 Control Units, 43XX Processors, 9370 Processor, and the 3694 Document Processor. Multiple models offer speeds up to 400 CPS and color printing. Advanced print functions are implemented through the new Intelligent Printer Data Stream (IPDS).

### MODELS 201, 202, 2E2, 2C2

**Model 201:** 200 CPS maximum (64K Memory)

**Model 202:** 400 CPS maximum (64K Memory)

**Model 2E2:** 400 CPS maximum - Expanded storage (512K Memory)

**Model 2C2:** 400 CPS maximum - Color and expanded storage (512K Memory)

**Note:** GDDM graphics applications may not run satisfactorily on 4224 models without expanded storage. Therefore, the expanded storage models (2E2 and 2C2) are recommended and should be ordered initially if use of GDDM is planned.

### Prerequisites:

ATTACHMENT	REQUIREMENT
Non-IPDS Mode	
3174 Subsystem Control Unit	An available terminal port
3274 Control Unit	An available Category A terminal port*
3276 Control Unit	An available terminal port
4321/31 Processor	An available position on the Display/Printer Adapter
4361 Processor	An available position on the Display/Printer Adapter or the Workstation Adapter
3694 Document Processor	An available position on the Device Cluster Adapter

\* When attaching the IBM 4224 to an IBM 3274 Control Unit using Configuration Support D at Release 65.0, contact the

IBM 3274 National Service Division representative for support information; refer them to 3274 RETAIN TIP #756.

### IPDS Mode

3174 Subsystem Control Unit      An available terminal port and Release 2 Microcode

3274 Control Unit      An available Category A terminal port and Configuration Support D Microcode at Release 65 or higher. Contact the IBM 3274 National Service Division representative for support information; refer them to 3274 RETAIN TIP #756.

4361 Processor      An available position on the Workstation Adapter and Specify #9261 installed

9370 Processor      Workstation Subsystem Controller (#6020)

### SOFTWARE REQUIREMENTS:

#### Non-IPDS Mode

3268/3287 Compatibility (except PSS graphics)      No special requirements

#### IPDS Mode

Graphics functions      GDDM V2.1 under MVS/VM(Non-RSCS)/VSE

**Customer Setup (CSU):** The 4224 is designated as a customer setup machine. Setup instructions are included with each machine.

### HIGHLIGHTS

- Two basic rated print speeds: 200 CPS (9 wire head); 400 CPS (18 wire head)
- Three print quality modes and rated print speeds:

Mode	Model 201	Models 202, 2E2, 2C2
DP	200 CPS	400 CPS
DP TEXT	100 CPS	200 CPS
NLQ	50 CPS	100 CPS

Note: See "Throughput Considerations"

● Print quality mode descriptions:

DP Mode - The character box is 9 dots high by 10 dots wide. The nominal DP character matrix is 7 dots high (2.49mm or 0.098 in.) by 4 of 7 wide. Maximum character box height is 3.20mm (0.126 in.).

DP Text Mode - The dot density is doubled horizontally compared to DP mode. The character box is 9 dots high by 20 dots wide. The nominal DP Text character matrix is 7 dots high (2.49mm or 0.098 in.) by 7 of 13 wide. Maximum character box height is 3.20mm (0.126 in.).

NLQ Mode (Near Letter Quality) - The dot density is doubled both horizontally and vertically compared to DP mode. The character box is 18 dots high by 20 dots wide. The nominal NLQ character matrix is 12 dots high (2.31mm or 0.091 in.) by 7 of 13 wide. Maximum character box height is 3.33mm (0.133 in.).

- Vertical spacing can be set for 3/4/6/8 lines per inch from the data stream or 6/8 lines per inch from the operator panel.
- Horizontal spacing of 10, 12, and 15 characters per inch. A special proportional font is available (when using the Intelligent Printer Data Stream) in DP TEXT and NLQ resulting in an average spacing of 11.5 characters per inch. Machines with serial number XX-F0001 and later also have 16.7 characters per inch in DP Mode only.
- Color printing (Model 2C2) is 4 or 8 colors as determined by ribbon type: (A 4 Color Primary ribbon is supplied with Model 2C2)

Accent Colors (4 Color Primary Ribbon): Black, Red, Blue, Green

Subtractive Colors (8 Color Process Ribbon: Black, Red, Blue, Green, Yellow, Magenta (Pink), Cyan (Turquoise), Brown

Two print passes are required to print the subtractive colors red, blue, green and brown.

- A special longer life black ribbon may be installed in the Model 2C2 and conveniently exchanged by the operator for a color ribbon when color printing is required.
- Advanced print functions, e.g., vector graphics, are supported through the new Intelligent Printer Data Stream (IPDS).
- Word processing functions include proportional spacing, sub/super script, and various emphasis capabilities (software dependent). Print quality, e.g., NLQ, is operator selectable and may be overridden by software.
- Print line max of 335.28mm (13.2 in.). Paper width from 76.2mm to 381.0mm (3 in. to 15 in.) (continuous forms).
- Multipart forms up to 6 parts (including original).
- Direct attachment to 3270 Control Units, 43XX Processors, and the 3694 Document Processor.
- Graphics printing at 144 x 144 dots per inch.
- Three operator changeable "forms modules" provide paper handling flexibility for continuous forms, document on demand, and document insertion. (See "Special Features").
- Front loading and straight paper path provides operator convenience, added reliability, and reduction of multipart form "shingling".
- Advanced jam detection checks for paper motion when using continuous forms (Continuous Forms Device and Document on Demand). Paper skew and insertion errors are detected when using cut forms (Document Insertion Device).
- Ribbon cartridge allows "clean hands" removal and installation.

- Operator replaceable printhead improves machine availability.
- Multi-function operator panel includes 3 position digital display.
- Compact table top design will fit a variety of commercially available printer tables and stands.

**National Languages:** National languages are selected via the operator panel. Available selections are:

Austrian/German  
Austrian/German (Alternate)  
Belgian  
Brazil  
Canadian French  
Canadian Bilingual  
Danish/Norwegian  
Danish/Norwegian (Alternate)  
English UK  
English US  
Finnish/Swedish  
Finnish/Swedish (Alternate)  
French  
French (Azerty)  
Italian  
Japanese/English  
Japanese/Katakana  
International 5  
Portuguese  
Portuguese (Alternate)  
Spanish  
Spanish (Alternate)  
Spanish-Speaking  
Swiss Bilingual  
Arabic  
Hebrew  
Icelandic  
Greek  
Turkish  
ROECE (Latin and Cyrillic)  
Yugoslav

**Physical Specifications:**

Height: 267mm (10.5 in.)  
Width: 642mm (25.3 in.)  
Depth: 358mm (14.0 in.)  
Weight: 22.68kg (50 lb.)

**Customer Responsibilities:**

1. Adequate site and system preparation. See "IBM 4224 Planning and Site Preparation", GC31-3625.
2. Ordering, installing, and maintaining cables.
3. Receipt at the customer's receiving dock, unpacking, and placement of the 4224 printer.
4. Physical setup, setting configuration options, printer checkout, installation of forms device, and cable connections.
5. Using and following the problem determination procedures before calling for IBM service.
6. Ordering and replacing a worn printhead and ensuring that a functional printhead is available for problem determination purposes.
7. Contacting IBM service to make cable connection to IBM non-CSU units where customer access areas are not provided.
8. Ordering and replacing the ribbon cartridge.

### Publications:

- Product & Programming Description GC31-2551
- Guide to Operations GC31-3621
- Operating Instructions GC31-2547
- Planning & Site Preparation GC31-3625
- Setup Instructions GC31-3607
- Maintenance Information SC31-3541
- Parts Catalog SC31-3542
- Intelligent Printer Data Stream (IPDS) Reference Manual 5544-3417\*

A special information binder is available, "4224 Printer Planning and Description Information", GC31-3605, which contains two key planning manuals conveniently packaged for presentation to customers:

- Planning and Site Preparation Manual (GC31-3625)
- Product and Programming Description Manual (GC31-2551)

Also see "KWIC Index", G320-1621, and specific system bibliography.

\* Planned availability is third quarter 1986

**System Attachment:** An interface card and coaxial connector for direct attachment to the 3174 Subsystem Control Unit, 3274 Control

Unit, 3276 Control Unit, the 4321/4332/4361 Processors (Display/Printer Adapter and Workstation Adapter), and the 3694 Document Processor. See "CABLES".

**Compatibility Considerations:** The 4224-2XX is data stream compatible with the 3268 and 3287 for non-graphics printing applications. There are minor differences described in the "4224 Printer Product and Programming Description Manual", GC31-2551, along with comparisons of Operator Panel functions between the 4224 and the 3268 and 3287 that should be reviewed. For example, the 4224 has no index key (3268) but does have vernier keys to move the forms up, down, and fast up. Fast up always moves the forms 1/6 of an inch. Unlike the 3268 and 3287, the 4224 does not support PSS graphics. Functional compatibility for graphics applications through IPDS is provided by GDDM Version 2.1. When selecting operator panel changes online (e.g., MPP or MPL), these changes are buffered and may not take effect immediately depending on the print job in process. Unlike the 3268/3287, overprinting of text can occur after Aborts, Buffer Reprints, and Cancels if the subsequent print job does not include an initial line feed. The 4224 does not support 16.7 characters per inch (3268). IPDS is available in SCS (SNA LU-1) and 3270 DSC (Non-SNA) environments only.

### Comparison with 3268/3287 Printers

Function	3268/87	Non-IPDS	4224 IPDS
Print Quality Selection			
DP	yes	yes	yes
DP TEXT	no	yes	yes
NLQ	no	yes	yes (G)
Page Size Control	yes	yes	yes
CPI Selection			
10 CPI	yes	yes	yes (G)
12/15 CPI	no	yes	yes
16.7 CPI	yes (3268)	yes*	yes*
Proportional Spacing	no	no	yes
Line Spacing			
3/4/6/8	yes	yes	yes (G,8 only)
Variable	no	no	yes
Color Printing	yes	yes	yes (G)
Advanced Function			
Word Processing			
Horiz & Vert Tabs	yes	yes	no
Underscore	yes	yes	yes (G)
Overstrike	yes (AP)	yes (AP)	yes
Emphasis (Bold)	no	no	yes (G)
Italics	no	no	yes
Double Strike	no	no	yes
Double Wide	no	no	yes
Super/Sub Script	no	no	yes
Font/Character Sel	Op Panel	Op Panel	yes (G)
Host Loadable Fonts	yes (PS)	no	yes (G)
APL Character Set	yes	yes	yes (G)
Bar Codes	yes (PS)	no	yes
OCR A and OCR B	no	no	yes
Graphics			
Lines	yes (PS)	no	yes (G)
Full Arcs/Ellipse	yes (PS)	no	yes (G)
Area Fill	yes (PS)	no	yes (G)
Line Types	yes (PS)	no	yes (G)
Markers	yes (PS)	no	yes (G)
Rotated Characters	yes (PS)	no	yes (G)
Large Characters	yes (PS)	no	yes (G)

## MACHINES

Graphics Images	yes (PS)	no	yes (G)
Images	yes (PS)	no	yes (G)
Overlays/Ret. Segments	no	no	yes

AP = Through Application Program only

PS = Programmed Symbols

G = Supported by GDDM Version 2.1

\* = Machines with serial number XX-F0001 and later

**Throughput Considerations:** The overall throughput depends on the print mode, application program, system response time, and the type of print operation being done. Any print operation that requires multiple passes or a reduction of horizontal dot spacing causes a reduction in the throughput.

Some print operations that affect throughput are:

- Heavy print patterns
- Line length (number of characters per line)
- Subtractive color printing
- Multiple colors on a single line
- Bold printing, double strike printing, and other types of emphasis
- Graphics printing

The 4224 uses an internal print management feature to guard against overheating the printhead due to the quantity of dots being printed. During extended printing of dense lines (greater than 60% of possible character positions printed), this safeguard may cause the print mechanism to slow down. The additional printing time, due to this slow down, lowers the overall throughput proportionally.

**Intelligent Printer Data Stream (IPDS):** IPDS is a structured field approach to management and control of printer processes and is designed to allow the presentation of text, raster images, vector graphics, bar codes and previously stored overlays at any point on a page. This structure allows data and commands to be sent to the device independently from the attachment protocol. This enables the same data stream to be used for printers attached to many different systems.

IPDS commands within the data stream enable the host processor to control and manage the down loading of fonts, symbol sets, and stored objects, such as overlays and page segments. The printer can later use these stored objects to construct a printed page. IPDS can significantly reduce the load on the host processor and the number of characters transmitted to the printer in many advanced printing applications.

**Programming Support:** Existing non-graphics printing applications for the 3268/3287 will support the 4224-2XX with no modification. The system programmer should configure the system as though a 3268 were installed. The 4224 is functionally compatible to the 3268 and 3287 printers except for the PSS command. The Graphical Data Display Manager (GDDM) Program Product Version 1, Release 4 uses the PSS command to support graphics and APA image printing applications with the 3268 and 3287. In order to achieve functional compatibility with the PSS command for these applications, GDDM Version 2, Release 1 must be used with the 4224. Other users of the PSS command must modify their programs to conform to the IPDS data stream which is used by the 4224 in all advanced function printing applications. The query reply will reflect 4224 characteristics which may be different from 3268 and 3287 information because of the additional functions supported. Although these replies will adhere to existing architectural format, applications using query replies may require modification because of these potential differences. The Product and Programming Description Manual, GC31-2551, will assist users in adapting their applications to take advantage of the advanced printing functions offered by the 4224, e.g., bar codes. GDDM Version 2, Release 1 will support the use of vector graphics in the IPDS data stream. Also supported are alphanumeric text, GDDM fonts, and user designed images.

## SPECIFY

- Voltage: Machines for AG-A/PG countries may either require low voltage (100 to 127V, 50/60 Hz, 1 phase) or high voltage (200 to 240V, 50/60 Hz, 1 phase) power supplies.

When both low and high voltage machines are required in a particular country, a specify feature must be used as follows:

#9200 for Low Voltage-120V (100v to 127v)  
#9201 for High Voltage-220V (200v to 240v)

- The specific non-locking power plug is automatically selected by the Country Code of the order. A 2.8m (9 ft) power cord is provided. For Japan specify type of power plug:

#9250 for Non-locking  
#9251 for Locking

- Forms Device: Specify one (only) at time of machine order.

#9501 for Continuous Forms Device (#4001), or  
#9502 for Document on Demand (#4002), or  
#9503 for Document Insertion Device (#4003)

See description of forms devices under "SPECIAL FEATURES".

## SPECIAL FEATURES

See "SPECIFY" for selection of one (1) forms device at time of machine order.

The Document on Demand (#4002) and Document Insertion Device (#4003) can not be installed on the Model 2C2 (color).

Additional forms devices must be ordered as Special Features. See (#4001, #4002, and #4003) below.

See Product and Programming Description Manual, GC31-2551, for form specifications and design information.

**Continuous Forms Device (#4001):** Provides an operator changeable "drop in" mechanism optimized for handling continuous forms. The right hand tractor is adjustable to accommodate forms width from 76.2mm to 381.0mm (3 in. to 15 in.). Forms length can be from 76.2mm to 355.6mm (3 in. to 14 in.). Up to six (6) part continuous forms may be used; however, for optimum feeding and stacking a maximum of four (4) parts is recommended. Limitations: Five (5) and six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Forms less than 152.4mm (6 in.) in length or width and forms greater than 317.5mm (12.5 in.) in length should be tested for satisfactory stacking. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4002 and #4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Document on Demand (#4002):** Provides an operator changeable "drop in" mechanism for handling continuous forms. For applications requiring removal (tear off) of the individual printed form without feeding a blank form or waiting for another form to print. The right hand tractor and feed rolls are adjustable to accommodate forms width from 76.2mm to 381.0mm (3 in. to 15 in.). Forms length can be from 76.2mm to 355.6mm (3 in. to 14 in.). Up to six (6) part continuous forms may be used; however, for optimum feeding and stacking a maximum of four (4) parts is recommended. Limitations: Not for Model 2C2. Five (5) and six (6) part forms should be tested

for satisfactory feeding, registration, and print quality. Forms less than 152.4mm (6 in.) in length or width and forms greater than 317.5mm (12.5 in.) in length should be tested for satisfactory stacking. Applications requiring more than 6 forms to be fed before separation (tear off) should be tested for satisfactory operation. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4001 and #4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Document Insertion Device (#4003):** Provides an operator changeable "drop in" mechanism to handle individually inserted forms. Includes a snap-on guide for the left edge of the form. The right hand set of feed rolls is adjustable to accommodate forms width from 76.2mm to 381.0mm (3 in. to 15 in.). Forms length can be from 177.8mm to 355.6mm (7 in. to 14 in.). Limitations: Not for Model 2C2. Forms over 330.2mm (13 in.) wide should be tested for satisfactory feeding and registration. Two (2) to six (6) part forms should be tested for satisfactory feeding, registration, and print quality. Multipart form sets must not be fastened with staples, and must be glued only at the top edge securely enough to prevent form separation while passing through the printer. This feature cannot be installed in the 4224 simultaneously with other forms handling features (#4001 and #4002). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

## MODEL CONVERSIONS

Field conversions can be made from Model 202 to Model 2E2. No other conversions are possible. Not Customer Setup.

**Note:** GDDM graphics applications may not run satisfactorily on 4224 models without expanded storage. Therefore, the expanded storage models (2E2 and 2C2) are recommended and should be ordered initially if use of GDDM is planned.

**Cables:** The 4224 is connected to the 3270, 43XX, 9370, or 3694 via coaxial cable or twisted pair cable. For information on coaxial cabling see "IBM 3270 Installation Manual- Physical Planning", GA27-2787. "Coaxial Cable and Accessories Manual", GA27-2805. For information on twisted pair cabling see "IBM Cabling System - Planning and Installation Guide", GA27-3361.

The customer is responsible for ordering, installation and maintenance of these cables and their various parts. The attachment cables may be purchased from IBM or from a customer-selected source. When coaxial cabling is ordered from IBM:

COAX CABLES FOR:	ASSEMBLED (P/N)	BULK (NO CONNECTORS) (P/N)
Indoor	2577672	0323921 (note 1)
Outdoor/Indoor	1833108	5252750 (note 2)
Plenum (Teflon)	4154741	4885584

### Connectors:

- Kit of Two indoor cable connectors - P/N 1836418 (note 1)
- Kit of One indoor connector - P/N 1836444
- Kit of Two outdoor cable connectors - P/N 1836419 (note 2)
- Kit of One outdoor connector - P/N 1836447
- Kit of Two plenum cable connectors - P/N 1743508 (note 3)
- Kit of One plenum connector - P/N 4449035

**Cable to Cable Adapter:** P/N 5252643 (note 6)

### Station Protectors:

- Kit for outdoor cable installation (includes two station protectors) - P/N 1830818 (note 4)
- Station protector attachment kit (includes two attachment adapters) - P/N 1833106 (note 5)
- Replacement station protector element (one connector) - P/N 5252899

### Notes:

- Coax wire and connector kits (includes two connectors P/N 1836444). Required for each cable assembly.
- Coax wire and connector kits (includes two connector P/N 1836447). Required for each cable assembly.
- Coax wire and connector kits (includes two connector P/N 4449035). Required for each cable assembly.
- Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
- Use to attach outdoor cable to station protector. One kit is required for each cable assembly.
- Use to join two P/N 2577672 or two P/N 1833108 or two P/N 4154741 cable assemblies together.

Order the above items via MES from Poughkeepsie.

Ordering Information: Operating Instructions, Guide to Operations, Setup Instructions, and the Operator Panel overlay are shipped in the language required for a particular country as determined by the Country Code. Exceptions, such as countries with 2 or more languages will require Specify features or special model numbers as explained below.

Spanish -- Mexico, Guatemala, Honduras, Bolivia, Dominican Republic, El Salvador, Nicaragua, Ecuador, Argentina, Columbia, Paraguay, Venezuela, Uruguay, Panama, Costa Rica, Peru, Chile

Canadian French -- Canada

English -- Canada, Australia, New Zealand, Bahamas, Barbados, Jamaica, Philippines, Thailand, Netherlands Antilles, Taiwan, Malaysia, Singapore, Indonesia, Bermuda

Katakana -- Japan

Orders from Canada require a Specify feature for language as follows:

- Specify #2934 for Canadian English
- Specify #2935 for Canadian French

Specify codes are required for the following Languages:

- #2800 for Arabic X/Basic
- #2801 for Hebrew Bulletin
- #2802 for Icelandic
- #2803 for Greek
- #2804 for Turkish
- #2805 for ROECE Latin
- #2806 for Cyrillic
- #2807 for Yugoslav

### Translated Publications

Language	P/N
Canadian/French	
Setup Instructions	64X8697
Operating Instructions	64X8700
GTO (Guide to Operations)	64X8698
English	
Setup Instructions	64X8695
Operating Instructions	56X8378
GTO	64X8694
Spanish	
Setup Instructions	64X8702
Operating Instructions	56X8363
GTO	64X8703
Japanese/Katakana	
Setup Instructions	64X8704
Operating Instructions	64X8708

## MACHINES

GTO

64X8705

- P/N 6115555, 4 Color Primary (2.7 Million Char.) (Model 2C2 only)
- P/N 6115554, 8 Color Process (2.7 Million Char.) (Model 2C2 only)

## ACCESSORIES

**Forms Stand (#4450), (P/N 2526750):** Provides for stacking of continuous forms on a stand after printing.

## SUPPLIES

- Ribbon Cartridge:
  - P/N 6091649, Black - 14 mm (average 4 Million Char.) (Models 201, 202, 2E2)
  - P/N 1040440 Black - 14 mm (average 6 Million Char.) (Model 201, 202, 2E2)
  - P/N 6115549, Black - 27 mm (6 Million Char.) (Model 2C2 only)

The above ribbon yields are derived from IBM conducted tests in DP Mode. Ribbon life experienced by the user may vary significantly depending on the users own quality criteria and on factors such as printer condition, machine settings, and paper quality.

Color ribbon yield was calculated as 1.2 million per black band plus 0.5 million for each of the three color bands.

- Printhead:

P/N 6091490, 9 Wire (Model 201 only)  
P/N 6091449, 18 Wire (Models 202, 2E2, 2C2)

The life expectancy of the 9 wire printhead is 125 million DP characters and 250 million for the 18 wire printhead. Printhead life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings, and ribbon used.

## 4234 DOT BAND PRINTER

### PURPOSE

Provides hard copy output for attachment to the S/36, S/38, 5294, 3274, (Canada only > 3694, <) and the 3276. The 4234 Printer also attaches to the ) 4331 and 4361 Processors via the Display Printer Adapter and to the 4361 via the Work Station Adapter, and to the 9370 via the Workstation Subsystem Controller.

### MODELS

**Model 1 001:** Attaches to the 3274, 3276, (Canada only > 3694, <) and Systems 4331/4361.

**Model 2 002:** Attaches to the System/36, System/38 and the 5294 Remote Controller communicating with a System/36 or System/38.

### Prerequisites

Attachment	Adapter on Control Unit
3274	Available Category A terminal port
3276	Available port or added #3255, #3256 or #3257
(Canada only) 3694	Available port or added #3101 (Device Cluster Adapter) <
4331/4361	Available position on 4331 or 4361 Display Printer Adapter or an available position on the 4361 Work Station Adapter (SCS, and Character Print Operation are not supported on the 4331/4361). Specify code #9841 must be ordered on 4331 and specify code #9261 must be ordered on the 4361.
S/36 S/38 5294	The 4234 Printer may be attached to the S/36, S/38, and the 5294 via user-provided twinaxial cable or the IBM Cabling System. See "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337 for cabling information.
9370	Workstation Subsystem Controller (#6020)

**Customer Setup (CSU):** The 4234 Printer is designated as customer setup thereby offering the customer early availability and relocation flexibility. For additional information on CSU, refer to the GI section of the IBM Sales Manual.

### HIGHLIGHTS

The 4234 Printer is a monochromatic dot band matrix line printer designed to operate in a semi-attended environment. The printer is floor standing, bottom forms loading and prints at a maximum speed of 410 lpm when printing in DRAFT mode, 300 lpm in DATA PROCESSING mode, and 120 lpm in NEAR LETTER QUALITY mode. It has a customer changeable print band allowing selection of different dot

sizes to best match the printer application. The dot size diameter can be 0.304, 0.406, 0.508mm (0.012, 0.016, or 0.020 inches) (one dot size per band). Smaller dot sizes for higher quality printing; larger dot sizes for higher speed draft printing. The printers are shipped with a 0.406mm (0.016 inch) dot size print band. Additional bands, either replacement or alternate element sizes, can be ordered as normal supply items.

On the 4234 Printer mdl 1, lines per inch (lpi) and characters per inch (cpi) are selectable at the operator panel or via the data stream control, when supported by the host system. Print Quality Select is controlled at the operator panel only. APL/TEXT is a standard function.

On the 4234 Printer mdl 2, lpi and cpi are supported from the host only and cannot be set at the operator panel. Print Quality select is controlled at the operator panel, but can be overridden by the host.

On both models, the vertical spacing is 25.4mm (3, 4, 6, or 8 lpi) plus 9 lpi for mdl 2 graphics. Dual Case Operation, Audible Alarm, and Cancel Print are provided as standard functions. The acoustical ratings are a very quiet 57db A, 58db AI, when printing and 44db A when idling.

Continuous forms are fed by a Variable Width Forms Tractor which accepts forms up to 406.4mm (16 in.) wide. The maximum forms length that can be accommodated is 355.6mm (14 in.). However, when using forms longer than 317.5mm (12.5 in.) the front door of the printer stand must be left open. When the door is open the acoustical level will be higher. Up to 6-part forms may be used. Forms of 5 or 6 parts should be tested on an individual basis for acceptable feeding, registration and print quality.

For forms design considerations refer to Appendix B of the "4234 Dot Band Printer Product and Programming Description", GC31-2554.

A 13.2 inch print line is standard. 10 and 15 characters per inch (cpi) provide 132 and 198 characters per line respectively.

The following print quality levels may be selected: (The maximum speeds indicated are when printing upper case non-accented characters.)

Draft	45 of 90 dpi* horizontal by 48 dpi* vertical. Upper case only. (Character height is 5 dots). Maximum of 410 lpm.
Data Processing	45 of 90 dpi* horizontal by 72 dpi* vertical (character height is 7 dots). Maximum of 300 lpm.
Near Letter Quality	90 of 90 dpi* horizontal by 96 dpi* vertical (character height is 9 dots). Maximum of 120 lpm.

\* dpi = dots per inch.

**Note:** The speeds and dpi densities are based on printing at 10 cpi and 6 lpi.

Because of the 4234 Printer's unique capability to allow the operator to change the print dot size, the resolution can be optimized at various speeds and print qualities to help meet the customers' requirements. The 0.406mm (0.016 in.) dot band is considered the standard general purpose band.

To assist the IBM Marketing Representatives in providing the proper documentation to the customers, a three ring binder "De-

scription and Planning Package" is available that includes the following 4234 Printer documents:

- Planning and Site Preparation
- Product and Programming Description
- Principles of Operations.

The kit is intended for the IBM Marketing Representatives and the individual books are available to the customers.

A black ribbon cartridge, P/N 6295158, and a print band with 0.406mm (0.016 in.) dot print-elements, P/N 6275528, will be shipped with each printer.

#### Physical Specifications

Height - 958mm (37.75 inches)  
Width - 660mm (26.0 inches)  
Depth - 765mm (30.25 inches)

The above measurements include the printer and the stand. A stand is shipped with every printer.

**Programming Support:** The 4234 Printer mdl 1 is supported on the 3274/3276 and the 4361 Work Station Adapter, similar to a 3262 Printer, and is compatible with the 3262 support. On the 4331/4361 the 4234 is supported on the Display/Printer Adapter as a 3287. The system programmer should configure the system as though a 3287 were attached.

The 4234 Printer mdl 2 is supported on the S/36 with Releases 3 and 4. With Release 3, the 4234 is configured as a 5225 Printer and software control of print quality is not supported. With Release 4, the 4234 is configured as a unique device, with OCL (Operator Control Language) control of print quality in addition to 5224/5225 equivalent OCL support.

Printing of graphics at 15 CPI is not supported for the System/36 Advanced Printer Function (5727-AP1/AP6). Advanced Printer Function graphics output which can be printed at 10 cpi is supported. System/36 Business Graphics Utilities (5727-BG1/BG6) printing is not supported on the 4234 printer.

The 4234 mdl 2 is supported on the S/38 with Release 7. Included is 5224/5225 equivalent support with CL (Control Language), print quality control with CL, and graphics printing with System/38 Business Graphics Utility (5714-GP1) and GDDM.

Printer of graphics at 15 cpi is not supported for the IBM System/38 Advanced Printer Function Utility (5714-UT2). Advanced Printer Function graphics output which can be printed at 10 cpi is supported.

**Problem Determination Procedure:** Significant function has been designed into this unit to provide greater availability to the customer. This has been done by the use of problem determination and recovery routines and procedures that can be understood and used by the casual operator. See "Customer Responsibilities" below.

**Performance Considerations:** Printer throughput is dependent upon operational and system characteristics. Factors such as host and controller configurations, line transmission speed, output format, and program application processing must all be considered in determining actual throughput.

In addition to printer mode (Draft, Data Processing, or Near-Letter Quality), characters per inch (cpi), and, in some cases, average line length, actual printer throughput is furthermore dependent upon system configuration, operational environment, and other document and programming characteristics.

The FIVE 3270 SE Aid (mdl 1 only) is available to estimate performance for the particular environment in which the 4234 Printer will be installed. Use of this aid is essential for understanding the effects of transmission speed, data stream protocol, and message sizes on printer throughput.

#### Mdl 1 Performance Considerations:

When attaching to a 3274 control unit, printer throughput (in lpm) may be affected by whether the 3274 is a local or remote model; for

remote control units, the protocol (BSC or SDLC) and transmission line speed; the operations by other devices attached to the 3274 control unit; and the data stream protocol (DSC, DSE, (LU3), or LU1 mode).

#### Print Speeds (Lines Per Minute)

Mdl 1 - Maximum print speeds for the 4234 mdl 1 when printing at 6 lpi, upper case\*, (and LU1 mode).

	Draft	Data Processing	Near Letter Quality
CPI	10 15	10 15	10 15
Mdl 1	410** (325)	300 85	120 60

Mdl 2 - When printing at 6 lpi, alphanumeric, upper case.

	Draft	Data Processing	Near Letter Quality
CPI	10 15	10 15	10 15
Mdl 2	410 (345) ***	300 85	120 60

\* Mixed case output will decrease throughput by approximately 10 percent.

\*\* When printing 80-132 cpl in Draft mode, throughput decreases from 410 to 325 lpm for the mdl 1.

\*\*\* When printing 80-132 cpl in Draft mode, the mdl 2 throughput decreases from 410 to 345 lpm. All other throughputs are insensitive to line length.

The following performance comparison was run by IBM using a job mix of 22 typical customer applications. The printing was at 6 lpi, 10 cpi, in DP print mode.

Printer	Relative Performance
4234-2	1.0
5224-2	0.6
5225-1	0.7
5225-2	1.0
5225-3	1.2

**Customer Responsibilities:** The customer is responsible for:

- Adequate site, system and other vendor preparation
- Receipt at the customer's receiving dock, unpacking and placement of the 4234 Dot Band Printer printer.
- Physical setup, connection of cables, switch settings and printer checkout.
- Using and following the problem determination procedures and filling out the trouble report prior to calling for IBM service.
- Contact Customer Engineering to make cable connection of IBM CSU units to IBM non-CSU units where access areas are not provided.
- Changing ribbons.
- Changing print bands.
- Cleaning print band and ribbon shield.

**Publications:** See "KWIC Index", GA20-1621, or specific system bibliography.

Customer Publications:

- Customer Setup Instructions, GC31-2552
- Principles of Operations, GC31-2553
- Product and Programming Description, GC31-2554
- Planning and Site Preparation Guide, GC31-2555
- Operating Instructions for Model 1, GC31-2556
- Operating Instructions for Model 2, GC31-2557
- Description and Planning Package, GC31-0058

**Language:** National Use Character Sets are selected via the operator panel for mdl 1 and 2. The selection can also be made via the SCGL SCS command from the host for the mdl 2. Character Sets which may be selected include:

Brazilian  
Canadian Bilingual  
US English  
UK English  
French  
International  
Japanese English  
Katakana  
Portuguese  
Spanish Speaking

## SPECIFY

- Additional Languages Supported: There is no additional charge for the specify codes.

Mdl 2

Support for the following languages on the 4234 Printer mdl 2 will be by a new release of PSH RPQs 8D0223 for the S/36 attach and 8D0224 for the S/38 attach: Thai.

See the RPQ description and price transmittal for features and limitations of this support.

These languages are ordered as model number L02. A specify feature code is not required.

- For the correct power plug and receptacle, refer to the "IBM 4234 Dot Band Printer Planning and Site Preparation Guide".
- Power, nomenclature, model: (One specify in 50 or 60 Hz chart selects all three.)

Freq.	Power Volts	Operator Panel Language	Mdl	Specify
50 Hz	100	Japanese	1	#9511
			2	#9513
50 Hz	110	English	1	#9515
			2	#9517
50 Hz	200	English	1	#9519
			2	#9523
		Japanese	1	#9520
			2	#9524
50 Hz	220-240	English	1	#9527
			2	#9537
		Spanish	1	#9528
			2	#9538
60 Hz	100-110	Brazilian	1	#9474
			2	#9482
		English	1	#9471
			2	#9479
		Japanese	1	#9473
			2	#9481
		Spanish	1	#9472
			2	#9480
60 Hz	120-127	English	1	#9487
			2	#9493
		French	1	#9489
			2	#9495

		Spanish	1	#9488
			2	#9494
60 Hz	200-220	English	1	#9499
			2	#9505
		Japanese	1	#9501
			2	#9507
		Spanish	1	#9500
			2	#9506

- Documentation: (Specify one.)

Language	Mdl 1	Mdl 2
Canadian	#9781	#9794
French		
English	#9775	#9788
Japanese	#9777	#9790
Spanish	#9776	#9789

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES (NONE)

## CABLES

**Coax:** The IBM cabling system or the coax cables and/or associated parts to attach the 4234 Printers to 3274s, 3276s, 3694s, (or Local Display Adapter (#4702) on the 3276,) or the 4331/4361/systems, or 9370 Processors, may be purchased from IBM or from a customer-selected source. For the proper identification, installation, and application of the subject cables and parts, see "IBM 3270 Installation Manual- Physical Planning", GA27-2787, and "Coaxial Cable and Accessories Manual", GA27-2805. The customer is responsible for installation and maintenance of these cables and their associated parts.

Coax Cables for:	Assembled (P/N)	Bulk (No Connectors) (P/N)
Indoor	2577672	0323921 (note 1)
Outdoor/Indoor	1833108	5252750 (note 2)
Plenum (Teflon)	4154741	4885584
Connectors	Part Number	
Kit of two indoor cable connectors	1836418 (note 1)	
One indoor connector	1836444	
Kit of two outdoor cable connectors	1836419 (note 2)	
One outdoor connector	1836447	
Kit of two plenum cable connectors	1743508 (note 3)	
One plenum connector	4449035	
Cable to cable adapter	5252643 (note 6)	

## MACHINES

### Station Protectors

Kit for outdoor  
cable install.  
(includes two  
station  
protectors) 1830818 (note 4)  
Station protector  
attachment kit  
(includes two  
attachment  
adapters) 1833106 (note 5)  
Replacement  
station protector  
element (one  
connector) 5252899

#### Notes:

1. Coax wire and connector kits (includes two connectors P/N 1836444). Required for each cable assembly.
2. Coax wire and connector kits (includes two connectors P/N 1836447). Required for each cable assembly.
3. Coax wire and connector kits (includes two connectors P/N 4449035). Required for each cable assembly.
4. Must be used with outdoor cable assembly when installed outdoors (either above or below ground level). One kit required for each cable assembly.
5. Used to attach outdoor cable to station protector. One kit is required for each cable assembly.
6. Used to join two P/N 2577672 or two P/N 1833108 or two P/N 4154741 cable assemblies together.

Order the above items via MES from Poughkeepsie.

**Twinax:** The IBM cabling system or the Twinax cables and/or associated parts for attachment to S/36, S/38, and the 5294 may be purchased from IBM or from a customer-selected source. For description of these cables and parts, see "IBM 5250 Information Display System Planning and Site Preparation Guide", GA21-9337 or "IBM 5280 Cable Assembly Manual", GA21-9341. The customer is responsible for the installation and maintenance of these cables and their associated parts. When cabling is ordered from IBM:

Twinax Cables for:	Assembled (P/N)	Bulk (No Connectors) (P/N)
Indoor/Outdoor	7362267	7362211 (note 1)
Plenum	7362062	7362061 (notes 2, 4)

### Connectors

Kit of two  
indoor/outdoor  
cable  
connectors 7362268 (note 1)  
Kit of two  
plenum cable

connectors	7362063 (note 2)
Cable to cable adapter	7362230 (notes 3,4)
Insulation tubing	483619 (note 4)
Twinaxial station protector	7361807 (note 5)

#### Notes:

1. The order must specify the desired length. One twinaxial connector kit, P/N 7362268, required for each cable. This is an indoor/outdoor cable. Two male connectors included.
2. The order must specify the desired length. One twinaxial connector kit, P/N 7362063, required for each cable. Two male connectors included.
3. Used to join two 7362267 or 7362262 cable assemblies together.
4. Must be used when connecting two Teflon covered cable assemblies P/N 7362062 together with adapter P/N 7362230.
5. The kit includes two protectors. One is required at the end of each twinaxial attachment cable installed outdoors (either above or below ground level). Individual twinaxial station protectors, P/N 7362426, are available for replacement purposes. The station protector is a CSU.

## SUPPLIES

**Ribbons:** A black ribbon cartridge, P/N 6295158 or equivalent is required. The ribbon cartridge has a print life of approximately 20 million characters, when printing in Data Processing mode and using the .016 dot band. Ribbon print life is derived from IBM conducted tests. Ribbon life experienced by a user may vary significantly depending on the user's own quality criteria and on factors such as printer condition, machine settings and paper quality.

**Print Bands:** Allows the customer to purchase additional print bands with different print dot sizes. The following dot element sizes are available:

Size	P/N	Description
304mm (0.012 in.) dot	6275527	For optimizing the quality of Near Letter Quality Printing.
406mm (0.016 in.) dot	6275528	General Purpose Printing.
508mm (0.020 in.) dot	6275529	For optimizing the quality of Draft printing.

For additional information regarding supplies refer to your country DP Supplies Coordinator.

## 4245 LINE PRINTER

### PURPOSE

Printer Output Unit: The 4245 Models 12 and 20 channel-attaches to virtual storage S/370 Models 148, 158, and 168, 303X, 308X, 3090, all 4300 Processors, and System/38 (5381 and 5382). The 4245 Models D12 and D20 attach to the 3274, 4700 Finance Systems, 4361 WSA (workstation adapter), 4361 DPA (display/prINTER adapter), and the 9370 Processor via Workstation Subsystem Controller. The 4245 Models T12 and T20 attach via a Twinax interface to the System/36 and the System/38. Print speeds are 1,200 and 2,000 lines per minute (lpm) based on a standard 48-character set.

### MODELS

**Model 1 001:** (NO LONGER AVAILABLE) Print speed 2,000 lpm.

**Model 12 012:** Print speed 1,200 lpm. This model channel-attaches to virtual storage S/370 Models 148, 158, and 168, 303X, 308X, 3090, all 4300 Processors, and System/38 (5381 and 5382).

**Model 20 020:** Print speed 2,000 lpm. This model channel-attaches to virtual storage S/370 Models 148, 158, and 168, 303X, 308X, 3090, all 4300 Processors, and System/38 (5381 and 5382).

**Model D12 D12:** Print speed 1,200 lpm. This model attaches to the 3274, 4700 Finance Systems, 4361 WSA (workstation adapter), 4361 DPA (display/prINTER adapter), and the 9370 Processor via Workstation Subsystem Controller.

**Model D20 D20:** Print speed 2,000 lpm. This model attaches to the 3274, 4700 Finance Systems, 4361 WSA (workstation adapter), 4361 DPA (display/prINTER adapter), and the 9370 Processor via Workstation Subsystem Controller.

**Model T12 T12:** Print speed 1,200 lpm. This model attaches via a Twinax interface to the System/36 and the System/38.

**Model T20 T20:** Print speed 2,000 lpm. This model attaches via a Twinax interface to the System/36 and the System/38.

### Limitations:

- Only marginally punched, pinfeed, continuous forms may be used. For multiple part forms it is recommended that both sides be securely fastened. However, when only one side is fastened it must be the right side.
- For full flexibility of column locations for margins, 451mm (17.8 in.) maximum width forms are recommended. If forms greater than 356mm (14 in.) in length are used, the rear stacker enclosure must be opened. If forms greater than 432mm (17 in.) in length are used, the front forms compartment door must be left open. For additional information, see "Forms Design Reference Guide for Printers", GA24-3488.
- No staples are permitted in the area exposed to the print band.
- Both edges of the form must be engaged by the pinfeed forms tractors.
- All 4245 models except model 1 may be used to generate input in OCR applications (see "Supplies" section for ribbon recommendations). Multiple-part forms are not recommended for OCR printing. The print quality of the top sheet is affected by the underlying sheets. Under no circumstances should the copy sheets be used for optical scanning. For best results use 75-90 g/sq.m (20-24 lb.) OCR bond in single-part form for printing. OCR form utilizing other papers should be tested for satisfactory results with user requirements. When reading 4245 documents on the 3886, reread on reject capability and 3211/5211 compatibility (#9701) should be used on the 3886.

For OCR-B, in addition to OCR numerics, only four specials (less than, greater than, plus and diagonal), and the 10 letters used by the ECMA (European Computer Manufacturing Association) and NRMA (National Retail Merchants Association) have been qualified in readability performance. These 10 letters are: A, C, E, N, P, R, S, T, V, X.

- Print quality and printer operation (such as forms feeding and stacking) varies with paper specifications, number of copies, ribbons, and environmental conditions (temperature and humidity).

Forms of more than four parts or forms with a first part heavier than 49 grams/sq. meter (13 pounds) should be tested under operating conditions to verify that results are satisfactory for the user applications. The maximum forms thickness is 0.51mm (0.020 in.).

(Japan only) Carbon forms of more than four parts or carbonless forms of more than five parts (Models 12, D12, and T12); carbon forms of more than three parts or carbonless forms of more than four parts (Models 20, D20, and T20) should be tested under operating conditions to verify that results are satisfactory. <)

### Prerequisites:

- One operator changeable print band for each 4245 printer (see "Specify" section).
- One control unit position on a system byte multiplexer, selector, or block multiplexer channel for each mdl 1, 12, 20 printer. A maximum of two 4245 Models 12 or 20 (or 3203 Model 5) can be attached to a System/38. See M5381 "Special Features" for attachment explanation.
- Models D12 and D20 attach via 3174, 3274, 4700 communication controllers, 4361 WSA or DPA as terminal or system printers, or System/38. Attachment as a 4361 system printer requires specify feature #9160 on the printer. See M4361 pages for additional prerequisites.
- Attachment of Models T12 and T20 to System/36 requires software Release 4 or later. Attachment of Models T12 and T20 to System/38 requires Release 7 or later release.

### HIGHLIGHTS

Print speeds are 1,200 and 2,000 lpm using a 48-character interchangeable print band. A variety of other character sets are available. Print speeds vary according to the size of the character set. The following table shows character sizes offered and expected speed ratings:

Character Set	Models 12, D12, T12	Models 20, D20, T20
48	1,200	2,000
48 (OCR)	1,200	2,000/1,906*
52	1,120	1,790
50, 63	980	1,570
94, 98	640	1,050
124	445	745
116	640	1,050
108, 127, 142	445	745
124	445	745

\* There is one set of OCR bands for use on any of the models. This set provides for higher OCR speed of 2,000 lpm. There is also an additional set of OCR bands specially designed for the Models 20, D20, and T20, providing better OCR print quality at 1,906 lpm.

Print speed depends on frequency of use of various characters. Most 4245 print bands have been optimized to add greater fre-

quency of commonly used characters. This enables most print jobs to run faster than if the frequency of all characters was equal.

132 print positions is standard. Horizontal spacing is 10 characters per inch. Vertical spacing is 6 or 8 lines per inch under program control (except System/36 Release 4 which is manual only). The carriage is a dual-speed unit with normal skipping up to 0.61m (24 in.) per second and high-speed skipping up to 1.4m (55 in.) per second after six lines have passed. The output forms stacker is power-assisted.

Continuous marginally punched forms are fed by a pair of forms tractors. Maximum forms dimensions are: Width - 559mm (22 in.); length - 610mm (24 in.). Minimum forms dimensions are: Width - 89mm (3.5 in.); length 76mm (3.0 in.).

**Note:** In the stacker, the minimum fold-to-fold length is 152mm (6.0 in.).

## Models D12 and D20:

**Performance Considerations:** Actual printer throughput and the number of printers attachable to the 3174 or 3274 Control Unit, 4701 or 4702 Finance Communication Controller or 4361 Processor Workstation Adapter or Display/Printer Adapter is dependent upon the system configuration, the operational environment and programming characteristics, including document characteristics. The following factors must be considered in determining actual throughput:

- System Configuration:
  - Local or remote 3174 or 3274 control unit
  - SNA or non-SNA environment
  - Other devices attached to the 3174 or 3274 Control Unit, 4701 or 4702 Finance Communication Controller, or 4361 Processor Workstation Adapter or Display/Printer Adapter.
- For Remote 3174s, 3274s or 4700s:
  - Communication Protocol (BSC/SDLC)
  - Transmission line speed
- Application processing and Document Characteristics:
  - Data organization
  - Output format: skipping, spacing, print line length
  - Character set size of print band application program

To determine whether the 4245 printer can achieve the desired throughput for a given situation, an initial estimate of anticipated throughput should be made on the basis of the speed of the desired printer model (Mdl D12 or D20) using the selected character set size (48, 64, etc.), and considerations of the output format for the document to be printed (as defined by average number of characters per line and lines skipped).

The output format translates into the character rate that is required when running at the desired speed. This character rate requirement will give a rough idea of the possible effects on printer throughput of other transactions processed by the 4361 Processor Workstation Adapter and, conversely, will help assess the significance of 4245 printer operations on the performance of other transactions processed by the 4361 Processor Workstation Adapter.

The character rate is especially important for remote 3174, 3274 or 4701 subsystems. Comparison of this character rate with available TP-link capacity (e.g., a maximum of 1,200 characters can be transmitted per second on a 100 percent utilized 9600 bps line) will show whether it is feasible to run the selected printer at its desired speed.

**Model D12 and D20 Performance Characteristics:** In addition to the performance considerations listed above, the 4245 mdls D12 and D20 are sensitive to data stream characteristics. Optimum throughput can be achieved using SNA LU-1 Data Streams. Significantly less than maximum rated speeds may be experienced when using BSC or DSC (SNA LU-3) Data Streams. Refer to the "Information Manual (Operator's Guide)", GA33-1586, for additional details.

## Recommendations:

- Run the 4245 D models in SCS LU-1 mode:
- In the VM/RSCS environment, RU=1,024, Pacing=2, VPacing=4 is a good starting point. RSCS Version 2 is recommended. It is best to use a dedicated RSCS Virtual Machine for the 4245 printer(s).
- In the MVS/JES328X environment, RU=1,280, Pacing=1, VPacing=5 is a good starting point. JES328X Version 2 is recommended. If PTF UB00879 is installed on JES328X Version 2, define the 4245 D model as a 4245 to JES328X and data compression will take place. If Version 1 is used or Version 2 without the PTF, define the 4245 D model as a 3262. Set the JES checkpoint page value to the 20-30 range. This has a performance versus error recovery trade-off the customer will have to make.
- If running in DSC mode, it is recommended that the Early Print Complete be activated in the printer for performance considerations. Again, this has performance versus error recovery implications that the customer will have to address.
- If running in DSE mode, it is recommended that LU1/SCS mode be used instead.
- It is highly recommended for remote installations, in either software environment, to use a dedicated line and dedicated 3174/3274. A minimum of 19.2KB line is recommended for a D12 and 56KB for a D20.

**Software Support:** The 4245 Models 12 and 20 can be run in native or compatibility mode. The mode of operation must be reflected in the operating system's I/O table. This may require an I/O generation. There are two compatibility modes: 1) 3211 for MVS and MVS/XA, and 2) 3262 Model 1 for VM and DOS/VSE.

MVS, VM, and DOS/VSE require that the image library contain Form Control Buffers (FCBs) for various print applications. For MVS, a new image library member must be created. When migrating applications from printers that use carriage control tapes, an FCB must be created that is equivalent to the carriage control tape. Otherwise, existing FCBs may be used. Note: JES2 requires a channel 1 in the first position of the FCB.

Customers should contact the IBM Support Center for all applicable PTF information. Related software product areas such as DFP and MVS/JES should be searched for PTFs as well.

Software support levels are shown in the chart below:

## Native Modes:

Oper. System	Minimum Level Required	Opt. Prod. Minimum Lvl. Required
DOS/VSE	VSE/AF 1.3.5 SIPO E 1.4.0 4245-12,20=PRT 1	POWER 2.1.0
VM/SP	SP3	HPO 3.2
OS/VS1	BPE4 and DFDS 1.2	
MVS/SP 370	MVS 1.3.4 and DFP 1.1	JES2 1.3.4 JES3 1.3.4
MVS/SP XA	MVS 2.1.2 and DFP XA 2.1	JES2 1.3.4 JES3 1.3.4

## Compatibility Modes:

Oper. System	Minimum Level Required	Opt. Prod. Minimum Lvl. Required

DOS/VSE	4245-12/20=PRT 1 (3262-01) VSE/AF 1.3.1 SIPO E 1.3.1*	POWER 1.2.0
VM/SP	4245-12/20 = 3262-01 SP2 SP3	HPO 3.2
MVS/SP 370	4245-12/20 = 3211 MVS 1.3.0	DFP 1.0 JES2 1.3.0 JES3 1.3.0
MVS/DP XA	4245-12/20 = 3211 MVS 2.1.1	DFP/XA 1.1 JES2 1.3.0 JES3 1.3.0

\* Contains VSE/AF 1.3.1 and VSE/POWER 1.2.0

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, and other vendor preparations
2. Replacement of the following items as necessary:
  - Ribbons
  - Print bands
  - Plastic ribbon shields
  - Vacuum bags

All of the above replacement items except vacuum bags can be purchased through country Systems Supplies Office. Vacuum bags will be supplied at no charge by Customer Engineering for IBM-maintained machines. See the "Supplies" section for further information. If the customer desires to have Customer Engineering replace or install any of these items, the CE time involved will be billed to the customer.

#### Bibliography:

- GC20-0001 - S/370
- GA33-1579 - IBM 4245 Printer, Models 12 and 20 Information Manual
- GA33-1586 - IBM 4245 Printer, Models D12 and D20 Information Manual
- GA33-1591 - IBM 4245 Printer, Models T12 and T20 Information Manual
- GX33-1508 - IBM 4245 Printer Models 12 and 20 Reference Summary for Operators
- GX33-1507 - IBM 4245 Printer, Models D12 and D20 Reference Summary for Operators
- GX33-1506 - IBM 4245 Printer, Models T12 and T20 Reference Summary for Operators
- GA33-1584 - IBM 4245 Printer, Models 12, D12, T12, 20, D20, and T20 Print Band Manual
- GC22-7064 - IBM System/360, System/370, 4300 Processors - I/O Equipment Installation Manual - Physical Planning
- GA32-0039 - IBM Input/Output Device Summary
- GA24-3488 - Forms Design Reference Guide for Printers

#### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Power (AC, 3-phase): Specify according to customer's power source.

50 Hz	60 Hz
200V #2807*	200V #2733*
220V #2815*	208V #9903*
380V #2816**	220V #2800*

400V #2825\*\*      240V #9915\*  
415V #2826\*\*      380V #2824\*\*

\* Delta connected

\*\* Y connected

- Machine Nomenclature: One must be specified. Field Installation: Not recommended.

Brazilian #2933      US English #2924  
Canadian      Japanese #2930  
Bilingual #2935      Spanish #2931  
UK English #2927

- Color: Machine is available in Pearl White only.
- Specify feature #9160 on Model D12 or D20 for attachment to 4361 Processor Workstation Adapter. See M4361 for prerequisites.
- Print Band Character Set: Select one band only by specifying one number from Groups A, B, and C. Please note some cases where selections from Group B or C are not required. When printing eight lines per inch, 2.0mm (0.079 in.) character height is recommended. One print band will be shipped at no charge with the printer. Replacement or additional print bands may be obtained by the customer for a charge. See "Supplies" section. Special (RPQ) print bands may be required. Please review printing requirements prior to placing the order.

#### Group A:

- #9520 48-Character EBCDIC
- #9530 48-Character OCR-AON (1) (4)
- #9534 48-Character OCR-BOA (1) (6)
- #9630 48-Character OCR-AON (mdl 20/D20/T20 only) (1) (5)
- #9634 48-Character OCR-BOA (mdl 20/D20/T20 only) (1) (5)
- #9521 50-Character Scientific
- #9526 52-Character FORTRAN/COBOL (2)
- RPQ S01090 60-Character S/38 Special (1) (2)
- #9524 63-Character ASCII (2)
- #9522 63-Character EBCDIC
- #9525 94-Character Commercial (1)
- #2985 84-Character Korean Hangeul-Type A (1) (2)
- #2976 84-Character Korean Hangeul-Type B (1) (2)
- #9537 98-Character ASCII (1) (2)
- #2872 108-Character Japan Katakana
- #2779 116-Character Canadian French
- #9527 124-Character Scientific (1)
- #2873 127-Character Japan Katakana
- #2785 127-Character Katakana/OCR (Model 12 only)
- #2808 127-Character Katakana/OCR (Model 20 only)
- #2781 142-Character Canadian-Bilingual (1) (2)

#### Group B:

#2950 International  
#2975 Brazil  
#2977 Canadian French  
#2955 Japan/English  
#2973 Japanese Katakana (3)  
#2961 Spanish Speaking  
#2958 UK English  
#2956 US English

#### Group C:

#9950 2.4mm (0.095 in.)  
#9951 2.0mm (0.079 in.)

#### Notes:

1. Available only with the 2.4mm (0.095 in.) character height. No selection from Group C is required.
2. A selection from Group B is not required.
3. Japanese Katakana available only for 108 (#2872) and 127 (#2873) (Mdl 1 only), RPQ S00704 (Mdl 12 only), RPQ S00706 (Mdl 20 only), RPQ S00714 character sets.

4. Available only with language selection (See Group B) #2956, #2958, #2961.
5. Available only with language selection (see Group B) #2956.
6. Available only with language selection (see Group B) #2956, #2958. If using multiple bands of different languages for this character set, the customer must ensure the correct band (language) is installed on the printer, since the print band verification done by the printer will not distinguish among different languages for this character set.

#### SPECIAL FEATURES (NONE)

#### MODEL CONVERSIONS

Upgrades may be made in the field from a Model 12 to a Model 20, from a Model D12 to a Model D20, or from a Model T12 to a Model T20. 4245 D12/D20 without specify feature #9160 may be changed in the field to a D12/D20 with specify feature #9160 and vice versa. Conversions cannot be made from a Model 12 to a Model D12 or a Model 20 to a Model D20. All conversions require MES orders.

#### ACCESSORIES

See "Customer Responsibilities" under "Highlights".

#### SUPPLIES

##### Ribbons

- P/N 7034437 (No Longer Available) or equivalent is required for all non-OCR printing applications.
- P/N 6204923, or equivalent is required for OCR printing applications.

**Print Bands:** Replacement or additional bands are available. See the 4245 Print Band manual (GA33-1584) for print band P/Ns.

**Plastic Ribbon Shields:** P/N 6092766, or equivalent is required.

For all of the above supplies, ordering information and prices may be obtained through country Systems Supplies Office.

## 4248 IMPACT LINE PRINTER

### PURPOSE

The 4248-002 Printer is a new addition to the IBM family of high speed impact printers. Using a new hammer magnet technology and an etched steel print band, the 4248-002 achieves print quality at 4000 lpm which approaches that of the 4248-1 at 3000 lpm and print density on multipart forms equivalent to that of the 3211. Ergonomic enhancements facilitate operator setup and utilization, such as elimination of platen wear strips and the ability to store up to 20 job setups for instant recall. OCR capability is a standard feature at 2200 lpm. The enhanced print quality, superior performance and function, and reliability make this machine an excellent growth path for 3211, 4245, 3203 and 1403 customers. It also provides an offering for non-IBM users to consider new levels of performance and reliability. The 4248-002 attaches via a channel to 43XX, 303X, 308X, 3090 and 9370 processors.

### MODELS

**Model 001 (No Longer Available)**

**Model 002**

**Limitations:** Although the 4248-002 has selectable speeds of 2200, 3200 and 4000 lpm, actual performance will vary depending on the printband, spacing, skipping and actual data to be printed. Attachment to a byte multiplex channel is not recommended due to the potential for degradation in performance. See the throughput calculation section of the "4248-002 Printer Description", GA24-3991.

When operating in 3211 mode, the following 4248 features are not available:

- Host-controlled speed selection
- Host-controlled intermixing of vertical spacing
- Automatic print band verification
- Horizontal Copy
- Optional print positions (above 150)

The 4248 is a multi-speed printer that offers significantly higher levels of speed and function in impact printers. It allows the user to select the speed that provides the level of print quality needed for each application.

**Customer Setup:** The 4248-002 is not designed as a Customer Setup (CSU) machine.

### DESCRIPTION

- Program or Operator Selectable Speeds - Print speeds are selectable in three options; 2200, 3200, and 4000 lpm. This allows the operator to select the best speed for an application. In 3211 mode speed, selection is always from the operator panel. In 4248 mode, speed is selected by Forms Control Buffer information or from the operator panel.
- OCR Capability Standard at 2200 lpm - The proper print band, ribbon, and paper are all that are required to obtain OCR-A or OCR-B numeric printing that is machine readable.
- Recall Job Setup - The Operator can set up and store up to twenty different print jobs for recall at any time. This includes basic operator job set up controls: Print Density, Hammer Adjust, Speed, Stacker Mode.
- Two Modes of Operation are Available - In 3211 mode with 3211 Printer application programs, or in 4248 mode, the printer runs at approximate 4248-002 rated speeds. In 4248 mode all the advanced 4248-002 functions are supported.
- 168 Print Positions are Available - 132 Positions are standard. Horizontal Copy at 168 print positions allows the user to print two original documents (up to 80 columns wide) of the same

information on a single form side by side. See feature code #3751 or #3753.

- Advanced, Fully-Enclosed Power Stacker - The power stacker has one mechanical operator adjustment for the length of the form. After approximately 17 inches of form have accumulated in the stacker, the operator slides the stacker tray out and removes the form. Difficulty in stacking some forms, such as card stock, can be avoided through the use of another 4248 capability that allows the operator to control the stacker tray height from the operator panel.
- High Level of Reliability - The reliability of the 4248-002 is demonstrated by the one-year warranty, the absence of any required preventive maintenance and the attractive MMMC. Optimum print quality can be maintained by the customer by running the hammer flight time routine.
- Enhanced Print Quality - Print Quality is enhanced over the 4248-001. A new platen and hammer magnet technology increases the hammer energy and slows the printband velocity while printing at high speed. Multipart capability has been increased to 6-part at low and medium speeds and four part at high speed. Overall Print Density is improved at all speeds.
- Wide Range of Program Support Available - The printer is supported in both 4248 and 3211 modes by VSE, VM/SP, VM/XA, and MVS. See the Software Requirements section for specifics.

### Print Quality General Recommendations

#### Low Speed (2200 lpm)

- Print Quality: Equivalent or superior to that of the 3211 or 3203.
- Application: Preferred for best quality printing.
- Part Forms: 1-6\*

#### OCR Printing (2200 lpm)

- Print Quality: OCR Readable.
- Application: Required for OCR Applications.
- Part Form: 1 \*\*

#### Medium Speed (3200 lpm)

- Print Quality: Less than at low speed but generally comparable to that of the 3211 and 3203.
- Application: Recommended for most applications except OCR.
- Part Forms: 1-6\*

#### High Speed (4,000 lpm)

- Print Quality: Less than medium speed but approaching the print quality of the 4248-001 at medium speed.
- Application: Customers should assess on an individual application basis to ensure print quality will meet end user requirements.
- Part Forms: 1-4\*

\* Multipart forms over 4-part and special forms, including those used on other printers, should be tested on the 4248-002 for acceptance.

\*\* OCR paper, ribbon, and printband requirements are necessary. These have not changed with use of the new model.

The 4248 is capable of multiply printing up to 6-part forms. However, the following general limitations must be observed:

- Maximum form set thickness of 0.51mm (0.020 in.).
- Four-part maximum at high (4,000 lpm) speed.
- Forms sets of more than 4-parts should be tested for acceptable print quality of the copies.
- Single-part forms are recommended for OCR.

See "Forms Design Reference Guide for Printers", GA24-3488, for details.

## HIGHLIGHTS

- Enhanced print quality at high speed and improved multipart form capability over 4248-001.
- Recall Job Setup capability of up to 20 jobs through the operator panel.
- Program or operator selectable speeds of 2200, 3200 and 4000 lpm and OCR capability standard at 2200 lpm.
- A new platen that eliminates the need for platen wear strips.
- High level of reliability.
- 132 print positions are standard; 168 are available.
- Advanced, fully enclosed power stacker.

**Maintenance:** Maintenance is available 24 hours/day, 7 days/week.  
Maintenance exclusions - consumables including:

Print Band  
Ribbons  
Forms Retention Belts  
Ribbon Shield  
Vacuum Cleaner Bags

When an error occurs, the customer will be asked to follow CPAR procedures, run diagnostic tests and, in some cases, replace consumables prior to calling for service.

## Physical Specifications

Width - 1525mm (60 inches)  
Depth - 1220mm (48 inches)  
Height - 1,350mm (53 inches)\*  
Weight - 865kg (393 pounds),  
including stacker  
Weight - 725kg (330 pounds),  
without stacker

\* Attention light is 70mm (3 in) additional.

## Operating Environment

Temperature - 16 to 32 degrees C (61 to 90 degrees F)  
Relative Humidity - 8 to 80 percent  
Wet Bulb Maximum - 23 degrees C (73 degrees F)

## PROGRAMMING SUPPORT

### Software Requirements

4248 Mode

Operating System	Minimum Release Level
VSE	VSE/SP 2.1.3 native mode VSE/SP 3.1.1 full support
VM/SP	3.0
VM/SP HPO	3.6
MVS/370	MVS/SP 1.3.4 and MVS/370 DFP 1.1 MVS/SP-JES2 1.3.4 MVS/SP-JES3 1.3.4
MVS/XA	MVS/SP 2.1.2 and MVS/XA DFP 2.1 MVS/SP-JES2 2.1.2 MVS/SP-JES3 2.1.2

3211 Mode

Operating System	Minimum Release Level
VSE	VSE/SP 1.1 VSE/AF 1.3.5

4248 Impact Line Printer

SIPO E 1.3.1	3.0
VM/SP	3.6
VM/SP HPO	1.0
VM/XA SF	MVS/SP 1.3.4 and
MVS/370	MVS/370 DFP 1.1
	MVS/SP-JES2 1.3.4
	MVS/SP-JES3 1.3.4
MVS/XA	MVS/XA 2.1.2
	MVS/XA DFP 1.1
	MVS/SP-JES2 1.3.4
	MVS/SP-JES3 1.3.4

## COMPATIBILITY

The 4248-002 will accept all 3211 commands when operating as a 3211. However, certain features of the 4248 are not available in 3211 mode. They are:

- Host controlled speed selection
- Host controlled inter-mixing of vertical spacing within a page
- Automatic Print Band Verification
- Horizontal Copy
- Optional Print Positions (above 150)

See "4248-002 Printer Description", GA24-3991, for details.

## SPECIFY

- The country standard voltage, power cord, nomenclature, and language will be supplied based upon the country code of order. Use the specify codes below only when an alternative to the country default is required.

60 Hz  
208V #2733  
240V #2802

- Machine Nomenclature: Field change or installation is not recommended.

Operator Panel	Safety Labels
#2934 US English	Brazilian
#2935 French	Fr/Fr Canadian
#2924 US English	US English
#2927 US English	UK English
#2930 English	Katakana
#2931 Spanish	Spanish

- Printband Specification: See Accessories section for a printband choice with feature codes.
- Color: Background color is pearl white. Accent covers will be pebble gray.

## SPECIAL FEATURES

| **Print Positions, 36 Additional (#3751):** Increased print positions from 132 to 168. Operation of the 4248 is unchanged. Maximum: One. Factory Installation: Yes. Field Removal: No.

| **Print Positions, 36 Additional (#3753):** Increased print positions from 132 to 168. Operation of the 4248 is unchanged. This is field equivalent of #3751. Maximum: One. Field Installation: Yes. Field Removal: No.

| **Print Positions, 36 Additional (#3753) on 4248 Model 001:** Increases print positions from 132 to 168. Operation of the 4248 Model 001 is unchanged. This is the field equivalent of #3751. Maximum: One. Field Installation: Yes. Field Removal: No.

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## MACHINES

### MODEL CONVERSIONS

**Model 001 To Model 002 Conversion:** A Model upgrade from model 001 to 002 is possible. See feature codes in the following table.

Feature Code	Model From	Model To
Designator	001	002 (132pp)
4132	001	002 (132pp)
4168	001	002 (168pp)

- International #2950
- Japanese English #2955
- Japanese Katakana\*\* #2973
- Spanish Speaking #2961
- UK English #2958
- US English #2956

\*\* Available only in 108 (#2780) and 127 (#2873, #2785) character sets.

### TABLE C - Character Set Height

- #9555\* 2.7mm (0.105 in.)
- #9950 2.4mm (0.095 in.)
- #9951 2.0mm (0.079 in.)

\* 3211 Style

### ACCESSORIES

**Printbands:** Select character set, language where necessary, and height from Tables A, B, and C. All must be specified on the order. One of the selected print bands will be provided free of charge with the 4248-002. Replacement and/or additional print bands are the customer's responsibility, and should be ordered through IBM Direct. If the customer desires to have Customer Engineering install the print band or other consumables, time involved will be billed to the customer.

Special (RPQ) print bands are available on the initial machine order. With a special printband, the machine order will be scheduled to allow time for estimation, design, and tooling of the printband. Please review printing requirements with your customer prior to placing the order.

### TABLE A

- #9520 48-character set: EBCDIC
  - #9521 50-character set: Scientific
  - #9533 50-character set: Commercial
  - #9526 (2) 52-character set: FORTRAN/COBOL
  - #9524 (2) 63-character set: ASCII
  - #9522 63-character set: EBCDIC
  - #9525 (1) 94-character set: Text
  - #9527 (1) 122-character set: Text
  - #2780 (1) 108-character set: Katakana
  - #2873 (1) 127-character set: Katakana
  - #2779 (1) 116-character set: French Canadian
  - #2781 (1) 142-character set: Canadian Bilingual
  - #2785 (3) 127-character set: OCR/Katakana
  - #2739 OCR: AON Spanish Speaking
  - #9530 (1) OCR: AON
  - #9531 (1) OCR: BON
  - #9532 OCR: BON Japan (48 character)
  - #2985 (3) 86-character set: Hangul
1. Available only in 2.4mm (0.095 in.) character height.
  2. Available only with US English.
  3. Available only in 2.7mm (0.105 in.) character height.

### TABLE B

- Brazil #2975
- French Canadian #2977

### SUPPLIES

None required with machine order. A "Starter Pac" is available from your Country DP Supplies Coordinator and should be considered for the first 4248 installed in an account. See the Supplies Coordinator for details on the "Starter Pac" and other supplies.

The customer is responsible for the following consumables:

Print Band  
Ribbons  
Ribbon Shield  
Forms Retention Belt  
Vacuum Cleaner Bag

Consumables available from IBM are:

Item	Estimated Life
Printband	80,000,000 Lines*
Ribbon-High Contrast	1,200,000 Lines*
Ribbon-Long Life	2,000,000 Lines*
Ribbon-OCR	180,000 Lines*
Ribbon-Polyester	180,000 Lines*
Ribbon-Shield	10,000,000 Lines
Forms Retention Belt	10,000,000 Lines
Vacuum Cleaner Bag	15,000,000 Lines

\* Estimated life derived from IBM testing at 2,200 lpm for the OCR and High Contrast ribbons and 3,200 lpm using 0.105-inch high font for the others.

Printband and ribbon life experienced by a user varies significantly depending on printer condition, machine setting, paper quality, print band condition, font height, high use of small area characters and other factors.

If the customer desires Customer Engineering to replace or install any of these items, the time involved will be billed to the customer.

## 4250 PRINTER

| THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

The 4250 is a high-resolution non-impact printer. It is all-points-addressable (APA) with an addressing resolution of 600 dots per inch in both horizontal and vertical direction and can print a wide variety of text in various styles and sizes, graphics objects with various complexity. As an all-points-addressable device the 4250 can print host system-supplied dot patterns. The 4250, together with associated software such as Document Composition Facility (DCF) Release 3 and Graphical Data Display Manager (GDDM) Release 3, provide a new level of print quality, function, and ease-of-use for a variety of customer applications such as documentation, production of manuals, brochures, reports, newsletters, presentations, etc. Based on electro-erosion technology, the 4250 produces type-set quality camera-ready master-pages directly from an IBM host computer system without photo-sensitive processes and costly darkroom facilities. Unlike traditional photo typesetters, the 4250 output is dry and immediately visible and usable. The output can be reproduced by using the conventional reproduction methods used in the reproduction industry. If the output is reproduced via copiers, the customer should evaluate the results of the copying process on the specific copier.

### MODEL 1

#### Model 1 001

**Limitations:** A blackness ratio of 50% per page should not be exceeded. In case of simulated halftones customers should evaluate these against their application requirements.

#### Prerequisites:

##### 3274 Mdl 1A Attachment:

- #9112 Configuration Support C at release level 46 or higher.
- Enough control storage to customize for SCS printer support (SCS), structured field and Attribute processing (SFAP) and one extended attribute terminal (EAT) for each 4250 attached.

##### 3274 Mdl 1D Attachment:

- #9112 Configuration Support C at release level 46 or higher.
- Enough storage to customize for SFAP and one EAT for each 4250 attached.

##### 3274 Mdl 31A or 31D Attachment:

- #9112 Configuration Support C level 46 or higher. Storage features are not required, but enough control storage must be available to customize for SFAP. SCS support is required for the 31A.

or

- #9124 Configuration Support D, and #3650 Extended Function Store Type C1, and #3101 Integrated Diskette Drive Enhancement.

3274 Mdl 41A or 41D Attachment: No features or special considerations required.

4331 Mdl 1, 2, or 11 Attachment: Specify code #9260 for DPA.

**Customer Setup (CSU):** The 4250 is a Customer Setup (CSU) machine, thereby offering the customer early availability and relocation flexibility. Setup procedures are shipped with each machine. The Customer Setup allowance is four days for each 4250 (regardless of quantity) starting from the day of the arrival at the customer's

shipping dock. For additional information on CSU, refer to the GI section.

### HIGHLIGHTS

- Provides high-quality (typeset-level) master pages at an addressing resolution of 600 dots per inch in horizontal and vertical direction.
- Provides immediately usable dry output and requires no chemical processes with costly darkroom facilities or special environmental considerations.
- Provides the capability of printing and merging of a wide variety of text, graphics and host generated dot patterns.
- The output of the 4250 is immediately visible.
- Uses aluminum-coated paper which is inexpensive compared to conventional photographic paper.
- Provides end-user convenience, small size, and silent operation suitable for an office environment.
- The output is easily reproducible and of archival quality.

**System Attachment:** The 4250 attaches to the 3174 Subsystem Control Unit mdls 1R, 2R, and 3R (which require RPQ #7B0980) and to the 3274 Control Unit, mdls 1A, 1D, 31A, 31D, 41A and 41D. Using these Control Units, the 4250 can be attached to any S/370 mdl 138 and up or 43XX and 30XX. In addition, the 4250 attaches directly to the 4331 and 4361 via the Integrated Display/Printer Adapter and the 4361 Workstation Adapter and to the 9370 via a Workstation Subsystem Controller.

**Human Factors:** The 4250 uses electro-erosion printing technology resulting in a quiet operating unit suitable for installation in an end-user environment. In conjunction with the programming support, the user can initiate re-transmission of a page, if for example, the paper roll is empty prior to reaching the end of the page. The output of the 4250 is immediately visible and no chemicals are involved in obtaining the high quality, camera-ready master-page.

**Problem Determination Procedures:** The microcode checks and monitors the status of the printer and provides status information on the two-digit display in case of malfunction. The Reference Card (GX33-1504) in the rear of the machine provides the problem determination steps. At initial power-on, an automatic sequence of tests checks the circuitry and measures the width of paper mounted in the machine. A subset of these tests is conducted whenever the reset key is depressed. Offline tests may be initiated via the Operator Control Keys to check the function of the electrode driver circuitry.

**Indicator Lights:** The 4250 has six function-indicators and a 2-digit display which provide status and error code information. A power indicator light is also provided.

**Operator Control Keys:** The keyboard contains 16 keys. Those of prime importance to the operator such as Start, Stop, Paper Advance, and Reset, are brightly colored for positive recognition. The remaining keys, for application interface and problem determination, are used primarily by the CE.

**Performance Considerations:** The 4250 is an all-points-addressable printer and performance measures such as lines per minute or characters per second are not meaningful. The physical speed of the print head is one meter per second (approximately 40 inches per second). The actual time to print one page is dependent upon:

- Complexity and size of the page.
- Content of a page, e.g., number of skips, line length, etc.

For planning purposes, the printing time for an average A4 size page ranges between 1.5 and 2.5 minutes provided the 4250 operates at maximum printing speed.

**IBM Aids:** The FIVE/3270 configurator will be enhanced to provide support for 4250 attached to the 3274 control unit.

**Customer Responsibilities:** The customer is responsible for:

1. Adequate site, system, and other vendor preparation.
2. Receipt at the customer's receiving dock, unpacking and placement of the 4250 at initial setup.
3. Physical setup, connections of cables in customers access areas and check-out.
4. Contacting IBM Customer Engineering to make cable connections of IBM CSU units to non-CSU units where customer access areas are not provided.
5. Procurement, installation, and maintenance of cables. See "Accessories".
6. Disconnection and removal to the customer's shipping dock at the time of discontinuance. Appropriate instructions will be provided by IBM.

**Shipping Materials:** All shipments are from the plant of manufacture. Packaging material need not to be returned.

#### Programming Support:

**System Support:** The 4250 is supported for operation under the following operating systems:

- VM/CMS -- The 4250 is running under VM/SP Release 1 and 2 specifying the 4250 as an unsupported device. VM/SP Release 3 provides standard support as a dedicated device.
- VSE/Advanced Functions -- VSE/Advanced Function Release 3 with either ACF/VTAM Release 3 or ACF/VTAM Version 2 or ACF/VTAME.
- MVS/370 (MVS/SP Version 1 Release 3 or later). ACF/VTAM Release 3 or ACF/VTAM Version 2.
- MVS/XA (MVS/SP Version 2 Release 1 or later). ACF/VTAM Release 3 or ACF/VTAM Version 2.

**Application Support:** The 4250 will be supported by the following strategic IBM Application Packages:

- Document Composition Facility Release 3 (5748-XX9).
- Document Library Facility Release 3.
- Graphical Data Display Manager Release 3 (5748-XXH) on MVS/TSO and VM/SP CMS only.
- Composed Document Printing Facility (CDPF).
- IBM Typographic Fonts for the IBM 4250.

**Basic Configuration:** The basic machine is shipped with a non-locking power cable plug and a 4.3m (14 ft) power cable. See "Specify".

#### Publications:

- "Planning and Site Preparation Guide" (GA33-1552)
- "Component Description and Programming Information Manual" (GA33-1554)
- "Operator's Guide" (GA33-1551)
- "Customer Setup Instructions" (GA33-1553)
- "Reference Card" (GX33-1504)
- "Trouble Report Form" (GX33-1503)
- "IBM 4250 Printer: Type Styles Portfolio" (G520-0004)

#### SPECIFY

- Voltage (AC, 1-phase, 3-wire): Nonlocking plug.
 

50 Hz	60 Hz
100V #2804	100V #2730
200V #2806	120V #9911
220V #2813	200V #2732
230V #2821	208V #9902
240V #2801	220V #2803
	240V #2831
- Power Cable Length: #9511 for 1.8m (6 ft).
- Color: Pearl White is the only available color. No specify required.
- Communication Cable: Communication cable is not shipped with the machine. The customer is responsible for procurement, installation, and maintenance of cable. See "Accessories".
- Installation Documentation: The default language for the installation documentation is English, for other languages specify:
 

Canadian French	#2935
Japanese	#2930

#### SPECIAL FEATURES

**4250 Print Adapter (#3930, P/N 6193065):** Provides the capability to communicate with a 4250 II ElectroCompositor or a 4250 Printer Model 001 from a Personal Computer over a standard IBM 3270 coaxial communications link. The card supports the emulation of an IBM 3274D cluster controller in driving the printer. The card is designed to be used with the an IBM PC AT (5170), PC XT (5162 Model 286), or Personal System/2 Model 30 (8530-021).

The sole purpose of the card is to handle the link level operation of the communication interface which includes all response time-sensitive commands. No data transferred from the PC to the 4250 will be interpreted by the adapter card. The 4250 Print Driver will correctly format the data for the 4250.

The card will provide a "backchannel" for the 4250 in that the printer status can be obtained and passed back to the PC by request.

The interface between the PC and the card consists of a set of shared registers, a protocol for using these registers, and the capability of the card to send an interrupt to the PC. The PC has the option of interacting with the card under CPU control or through the DMA channel.

Through the use of the 4250 Print Adapter, composed pages created on a host processor using Document Composition Facility may be printed on a 4250 attached to a PC. The PC may be attached to the host, either locally or remotely. In addition, in a stand-alone environment, documents created by PC page composition software packages which support the 4250 can be printed.

**Prerequisites:** DOS 3.1 or higher and 4250 Print Driver and at least one Typographic Font. **Customer Setup (CSU):** Yes.

#### Highlights:

- Full size PC card.
- Supports 4250 in a self-contained publishing environment.
- Provides the capability of outputting merged text, graphics, and image to a PC-driven 4250.

**Physical Specifications:** Full size card.

#### Operating Environment:

Temperature: 15.6 to 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity: 8 to 80 percent

## MACHINES

- | Wet Bulb: 23.0 degrees C (73 degrees F)
- | Publications: The following publication is shipped with the product:
- | P/N 6193073 Guide To Operations

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**Twisted-Pair Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide" (GA27-3361). For pricing

and ordering information, refer to the System Supplies operation within your country.

**Coaxial cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning" (GA27-2787) and "Coaxial Cable and Accessories Manual" (GA27-2805).

## SUPPLIES

Electro-erosion paper is available from your Country DP Supplies Coordinator. The paper is on rolls and supplied in cartons (10 rolls per carton). Four widths are available:

210mm x 100m (8.26 inches x 300 feet); P/N 7034360  
215.9mm x 100m (8.5 inches x 300 feet); P/N 7034361  
265mm x 100m (10.43 inches x 300 feet); P/N 7034362  
330mm x 100m (12.99 inches x 300 feet); P/N 7034363

The electro-erosion paper is a sensitive part of the machine. Use of paper that does not meet IBM specifications may result in unsatisfactory print quality or damage to the print head.

## 4250 II ELECTROCOMPOSITOR MODEL 002

### PURPOSE

The 4250 II ElectroCompositor Model 002 is a high resolution, non-impact printer capable of outputting a specially formulated pre-plate negative (electroNEG) or camera-ready masters. It is all points addressable (APA) with an addressing resolution of 600 x 600 dots (pels) per square inch. It can print a wide variety of text, image, and graphics in various type styles and sizes in an office or publications environment.

### MODELS

#### Model 002

**Limitations:** The printhead and print medium form a functional unit of the 4250 II ElectroCompositor. Using material that does not meet the specifications may cause unsatisfactory print quality and may damage the printhead.

When reproducing the 4250 II camera-ready master using a copier, it may be necessary to try different settings for copy density or different types of copiers to obtain optimum results.

A blackness ratio of 50% per page should not be exceeded. In case of simulated halftones, customers should evaluate these against their application requirements.

If electroNEG is to be archived, special handling and storage conditions are necessary. The material is susceptible to oxidation resulting in reduced optical density in areas where it has been handled and exposed to high humidity. To prevent this problem, it is recommended that handling be limited to non-image areas and the material stored in a cool, dry environment.

#### Prerequisites:

- If 4250 II is to be host attached, Composed Document Printing Facility PTF #PL07220 must be ordered.

#### ● 3274 Model 1A

Configuration Support C (#9112) at Release Level 46 or higher. Enough control storage to customize for SCS printer support, Structured Field and Attribute Processing (SFAP) and one Extended Attribute Terminal (EAT) for each 4250 attached.

#### ● 3274 Model 1D

Configuration Support C (#9112) at Release Level 46 or higher. Enough control storage to customize for SFAP and one EAT for each 4250 attached.

#### ● 3274 Models 31A and 31D

Configuration Support C (#9112) at Release Level 46 or higher. Storage features are not required, but enough control storage must be available to customize for SFAP. SCS support is required on Model 31A.

OR: Configuration Support D (#9124), EFS Type C1 (#3650) and Integrated Diskette Drive Enhancement (#3101).

#### ● 3274 Models 41A and 41D

No features or special considerations required.

#### ● 3274 Model 31C

Configuration Support C (#9112) at Release level 48 or higher, and #6303 High Performance Communication Adapter (SNA/SDLC only). Storage features are not re-

quired, but enough control storage must be available to customize for SFAP and SCS support.

Or, Configuration Support D (#9124) at Release Level 63 or higher, #3650 Extended Function Store Type C1, #3101 Integrated Diskette Drive Enhancement, and #6303 High Performance Communication Adapter (SNA/SDLC only).

#### ● 3274 Model 51C

Configuration Support C (#9112) at Release Level 48 or higher, (#1800 Extended Function Store (EFS) Type D4) or #1802 Control Storage Expansion (CSE) plus #3632 EFS Type D2 or #1802 CSE plus #3630 EFS Type D1 plus #3631 EFS Type D3, and #6303 High Performance Communication Adapter (SNA/SDLC only). Enough control storage must be available to customize for SFAP and SCS support.

Or, Configuration Support D (#9124) at Release Level 63 or higher, (#1800 Extended Function Store (EFS) Type D4) or #1802 Control Storage Expansion (CSE) plus #3632 EFS Type D2 or #1802 CSE plus #3630 EFS Type D1 plus #3631 EFS Type D3, #3650 EFS Type C1, #5101 Integrated Diskette Drive Enhancement, and #6303 High Performance Communication Adapter (SNA/SDLC only).

#### ● 3274 Model 41C, 61C

Configuration Support D (#9124) at Release Level 63 or higher, and #6303 High Performance Communication Adapter (SNA/SDLC only).

#### ● 3274 Models 31C, 41C, 51C and 61C - 3174 Models 1R, 2R, 3R, 51R, 52R, 53R, 81R, and 82R.

Requires 4250 RPQ #7B0980.

#### ● 4321, 4331

4250 Attachment (#9260) on the Display/Printer Adapter.

#### ● 5162, 5170, IBM Personal System/2 8530-021

Requires PC Attachment Card (#3930) and 4250 Print Driver (#0961).

**Customer Setup (CSU):** Yes.

### HIGHLIGHTS

- Provides high quality pre-plate negatives (electroNEG) or camera-ready master pages at an addressing resolution of 600 x 600 dots (pels) per square inch.
- Provides immediately usable dry output and requires no chemical processes, darkroom facilities, or special environmental considerations.
- Provides the capability of printing text merged with graphics and image.
- Output is immediately visible and usable.
- Through the use of electroNEG, the costly photographic process of negative creation is eliminated.
- If desired, camera-ready master paper which is less costly than conventional photographic materials may be used.
- Provides new take-up mechanism for convenient multi-page output handling.
- Provides end-user convenience - small size and quiet operation suitable for an office environment.

## DESCRIPTION

The output of the 4250 II ElectroCompositor is normally used as a high quality pre-plate negative for reproduction by a printing press. Its output is dry, immediately visible and usable, and does not require chemical processing as do traditional photographic techniques. For those jobs requiring camera-ready masters or for use as a proofing device, the 4250 II can output paper masters rather than electroNEG.

The 4250 II uses advanced electro-erosion technology. During printing, an electric current passes through high-precision guides with electrode tips onto aluminized polyester or paper. These tips create a high current density that heats and eliminates the aluminum layer. This results in a transparent area on electroNEG or a contrasting area on the paper. ElectroNEG can then be used directly to make a printing plate or the paper can be used as a camera-ready master.

Unlike traditional photographic technology, this process requires no special chemicals or facilities and is exceptionally clean, dry, and easy to use.

The 4250 II, with associated software such as the Document Composition Facility, Graphical Data Display Manager, Publishing Services Executive, Publishing Systems BookMaster, and the Publishing Graphics Facility, covers a wide spectrum of application areas. Output from the 4250 II is generally used in the production of manuals, procedures, price lists, forms, brochures, etc.

The 4250 II has been designed for ease of use. It offers a number of operator control keys and indicator lights. Also, with the programming support, the user can initiate retransmission of a page if necessary.

Currently installed 4250 Printer Model 001s can be field upgraded to the 4250 II ElectroCompositor.

## Physical Specifications:

Width: 750mm (29.5 in.)  
Depth: 500mm (19.7 in.)  
Height: 1,000mm (39.4 in.)  
Weight: 120kg (260 lbs.)

## Operating Environment:

Temperature: 15.6 to 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity: 8 to 80 percent  
Wet Bulb: 23.0 degrees C (73 degrees F)

**Publications:** The following publications are shipped with the product.

- GA66-0612 Operator's Guide
- GA66-0610 Introduction and Planning Guide
- GA66-0611 Customer Set-Up Instructions
- GA66-0614 Reference Information For Operators

Additional copies will be available.

The following publications will be available. To order, contact your IBM representative.

- GA66-0615 Reference Information For Printers
- GA66-0613 4250 II Programming Information
- GC33-6133 Composed Document Printing Facility: General Information Manual
- GH20-9158 Document Composition Facility and Document Library Facility: General Information Release 3
- SH35-0069 Document Composition Facility: Language Reference Guide
- SH35-0070 Document Composition Facility: Script/VS Text Programmer's Guide
- GC33-0319 Graphical Data Display Manager General Information
- SC33-0333 Graphical Data Display Manager Base: Programming Reference

- GX66-0300 4250 II electroNEG Reference Information for Printers

## SPECIFY

- Voltage (AC, 1-phase, 3-wire, 60Hz, non-locking plug): #9885 for 208V, or #9895 for 240V.
- Power Cable Plug: #9080 for watertight plug (where required for under raised floor connection) in lieu of non-locking plug.
- Power Cable Length: #9986 for 1.8m (6 ft.)

## SPECIAL FEATURES

**4250 Print Adapter (#3930, P/N 6193065):** Provides the capability to communicate with a 4250 II ElectroCompositor or a 4250 Printer Model 001 from a Personal Computer over a standard IBM 3270 coaxial communications link. The card supports the emulation of an IBM 3274D cluster controller in driving the printer. The card is designed to be used with the an IBM PC AT (5170), PC XT (5162 Model 286), or Personal System/2 Model 30 (8530-021).

The sole purpose of the card is to handle the link level operation of the communication interface which includes all response time-sensitive commands. No data transferred from the PC to the 4250 will be interpreted by the adapter card. The 4250 Print Driver will correctly format the data for the 4250.

The card will provide a "backchannel" for the 4250 in that the printer status can be obtained and passed back to the PC by request.

The interface between the PC and the card consists of a set of shared registers, a protocol for using these registers, and the capability of the card to send an interrupt to the PC. The PC has the option of interacting with the card under CPU control or through the DMA channel.

Through the use of the 4250 Print Adapter, composed pages created on a host processor using Document Composition Facility may be printed on a 4250 attached to a PC. The PC may be attached to the host, either locally or remotely. In addition, in a stand-alone environment, documents created by PC page composition software packages which support the 4250 can be printed.

**Prerequisites:** DOS 3.1 or higher and 4250 Print Driver and at least one Typographic Font. Customer Setup (CSU): Yes.

## Highlights:

- Full size PC card.
- Supports 4250 in a self-contained publishing environment.
- Provides the capability of outputting merged text, graphics, and image to a PC-driven 4250.

**Physical Specifications:** Full size card.

## Operating Environment:

Temperature: 15.6 to 32.2 degrees C (60 to 90 degrees F)  
Relative Humidity: 8 to 80 percent  
Wet Bulb: 23.0 degrees C (73 degrees F)

**Publications:** The following publication is shipped with the product: P/N 6193073 Guide To Operations

## MODEL CONVERSIONS

Model 001 may be field converted to Model 002.

Composed Document Printing Facility (PTF #PL07220) is required to support the Model 002.

## MACHINES

### ACCESSORIES (NONE)

### SUPPLIES

The 4250 II ElectroCompositor can accommodate electroNEG, a specially formulated pre-plate negative, or an electro-erosion paper. Both are available from National Distribution Division Systems Supplies using general National Distribution Division Systems Supplies ordering procedures. Outside the U.S., both are available from IBM Direct.

ElectroNEG is on rolls and is supplied in cartons of 4 rolls each in the following widths (minimum order quantity - 1 carton):

- P/N 6330578 258.0mm x 50m (10.16 inches x 164 feet) roll
- P/N 6330579 330.0mm x 50m (12.99 inches x 164 feet) roll

Yield is approximately 150 negatives per roll.

IBM warrants electroNEG to be free from defects in materials and workmanship at the time of purchase. IBM's entire liability is to replace or exchange the product within 12 months from date of purchase.

Electro-erosion paper is on rolls and is supplied in cartons of 10 rolls each in the following widths (minimum order quantity - 2 cartons):

- P/N 7034360 210.0mm x 100m (8.26 inches x 328 feet) roll
- P/N 7034361 215.9mm x 100m (8.50 inches x 328 feet) roll
- P/N 7034362 265.0mm x 100m (10.43 inches x 328 feet) roll
- P/N 7034363 330.0mm x 100m (12.99 inches x 328 feet) roll

Approximate yield - 300 masters per roll.

**Note:** ElectroNEG and the electro-erosion paper are a sensitive part of the machine. Use of material that does not meet IBM specifications may result in unsatisfactory print quality or damage to the printhead.

## 4321 PROCESSOR

(NO LONGER AVAILABLE)

\* MODEL UPGRADES FROM 4321 TO 4331 and 4361 ARE NO LONGER AVAILABLE.

Although the 4321 is no longer available, features, released RPQs, and accessories are not affected. No new RPQs will be accepted.

### PURPOSE

Provides the power, control, logic and memory circuitry necessary for the arithmetic, logic and processor storage functions of the 4321 Processor.

### MODELS

**Model J11:** 1,048,576 (bytes) Processor Storage

**Prerequisites:** Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console model 2A or a 3279 Color Display Console model 2C with keyboard and control panel is required for this purpose.

**Maximum Configuration:** The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to "IBM 4321, 4331 Processor Channel Characteristics, GA33-1527", or use the HONE aid ANCHLOAD.

### HIGHLIGHTS

The 4321 is a featured processor with one megabyte of processor storage and contains the following standard hardware features:

#### Equivalent feature number on 4331 MG1

128K bytes of control storage	#1901
One DASD adapter base	#3201
One 8809 adapter	#4910
Display/Printer Adapter Expansion (16 ports)	#2001
Communication Adapter Base	#1601
ECPS VM/370 (VM assist microcode)	#8701

These features are not ordered separately. Features and their specify codes not standard on the 4321 must be ordered individually for the 4321.

The processor contains 1,048,576 bytes of monolithic processor storage. Data flow is four bytes parallel. Storage fetch cycle is 900 nanoseconds for four bytes and the store cycle is 1,300 nanoseconds for four bytes. The processor is microcode controlled.

**Note:** The microcode which controls system operations resides in Processor Storage and Reloadable Control Storage. 4321 includes 131,072 bytes of Control Storage. In addition to the microcode contained in this storage, a minimum of 136,000 bytes of Processor Storage are occupied by microcode, RAS workspace and system data for the featured 4321 Processor.

#### Standard Functions:

- Processor storage -- 1,048,576 bytes. The 4321 Processor configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 below for details.

- ECPS/VSE Mode or S/370 Mode: The 4321 operates in either S/370 Mode or in ECPS/VSE mode. The system mode is selectable at Initial Program Load (IPL) time. S/370 mode is required for operation with VM/SP, ECPS/VSE mode for operation with SSX/VSE and DOS/VSE Release 3.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3179 Color Display Station (base color)
  - 3180 Model 1 Display Station
  - 3262 Line Printer Model 1 (650 lpm system printer)
  - 3262 Line Printer Model 11 (325 lpm system printer)
  - 3268 Printer Model 2 and 2C (340 cps)
  - 3289 Line Printer Model 4 (400 lpm system printer)
  - 3278 Display Station Model 2, and keyboards
  - 3279 Color Display Station Model 2A and keyboards
  - 3278 Display Console Model 2A, keyboard and control panel
  - 3279 Color Display Console Model 2C, keyboard and control panel
  - 3287 Printer Models 1, 2, 1C and 2C.
  - 4224 Printer Models 2XX (200/400 cps) (Non-IPDS Mode)
  - 4234 Model 1 Dot Band Printer
  - 4250 Printer
  - 5210 printer Models G01, G02
  - 6580 Displaywriter System Model A4, A6 A8, A10 (25-line display)

**Note:** SSX/VSE supports the 3279 Color Display Console Model 2C as a 3278-2A with no specific color support, i.e. color is determined via the default attribute byte only.

- The System Diskette Facility is the microcode loading system for the 4321 Processor. The diskettes shipped with the 4321 Processor will supply the required microcode including diagnostics. The System Diskette Facility also allows storage of failure data from 4321 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode of the 4321 Processor. The Reloadable Control Storage is not available to the user. 4321 includes 131,072 bytes of Reloadable Control Storage.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM specialists to remotely monitor and/or perform problem diagnosis on the 4321 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization), remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML/IPL and execute manual control functions on a remote 4321 via a 3275 (real or emulated) terminal at a host location. ROCF is an extension of the Remote Support Facility (RSF) and may be ordered as a no-charge specify feature.
- One Level addressing facility for improved virtual storage control by DOS/VSE and SSX/VSE (ECPS/VSE mode)
- Channels with virtual storage addressing (ECPS/VSE mode)
- Channel Indirect Data Addressing (in S/370 Mode)

#### Other Standard Functions are:

- Virtual Storage capability by Dynamic Address Translation
- Control by VSE (ECPS/VSE mode)
- S/370 Universal Instruction Set
- Extended Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte Oriented Operands

- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- Monitoring

**Programming Note:** The system mode will be invoked at IPL time and supports operation of an appropriately installed Control Program. In S/370 mode operation with VM/SP is supported. Operation in a CMS-only environment is recommended. In ECPS/VSE mode, operation of SSX/VSE and DOS/VSE Release 3 is supported.

**Console Function:** An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer. A 3278 Display Console Model 2A or a 3279 color Display Console Model 2C is required for this purpose. The Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4321 Processor hardware system, and one displays messages unique to the 3278 Display Console Model 2A or the 3279 Color Display Console Model 2C.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IPL and execute manual control functions on a remote 4321 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

**ECPS:VM/370:** The 4321 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/SP corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation and Virtual Interval Time. Limitations: May only operate when S/370 mode has been invoked by IPL.

**Byte Multiplexer Channel (Optional):** Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and Table 4 below for details. The channel permits simultaneous operations of low speed devices. Operates at up to 18K bytes per second in single-byte mode. Up to 500K bytes per second in burst mode. See "IBM Channel Characteristics (GA33-1527)" for devices which may attach and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0.

**Subchannels:** The 4321 Byte Multiplexer Channel (#5248) provides up to 31 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 31 subchannels is reduced by 5 for the standard DASD Adapter Base (2), 8809 Magnetic Tape Unit Adapter (2) and the Communications Adapter Base (1). The remaining 26 subchannels are reduced by one for the Block Multiplexer Channel (#1421) and one for each telecommunication line on the Communications Adapter Base.

**Block Multiplexer Channel (Optional):** Provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and Table 4 below for details. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. The 231X and 33XX devices (and the 3830 or 3880 storage control units) do not attach.

- Data rate is up to 0.5 million bytes per second -- see "IBM 4321/4331 Model Group 1 Channel Characteristics (GA33-1527)", for details. Standard channel address is 1, a different address may be selected at installation time from the range of 1 to 6.

**Subchannels:** The following subchannel combinations can be configured at installation time:

- up to 128 non-shared subchannels, and
- up to 16 shared subchannels, each with devices in multiples of 8, up to a total of 128 devices

**Integrated I/O Adapters:** The following I/O adapters control the designated I/O devices:

DASD Adapter Base (standard)  
 5424 Adapter  
 Loop Adapter  
 8809 Magnetic Tape Unit Adapter (standard)  
 Display/Printer Adapter (16 ports, standard)  
 Communications Adapter Base (standard)

**Note:** All data passing through the system for any I/O device interfaces with the data flow for other devices, producing I/O limitations. The limitations take two forms:

1. Hardware exclusivities
2. I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:
  - The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
  - The number and speed of lines attached to the Communications Adapter.
  - The number and class of overrunable devices on the Byte Multiplexer Channel.
  - The number and traffic on 3278 Model 2 or 3279 Models 2A, S2A attached to the Display/Printer Adapter.

It is necessary to consult "IBM 4321/4331 Channel Characteristics (GA33-1527)", to properly configure a 4321 with an I/O configuration that has not previously been analyzed.

**DASD Adapter Base (Standard):** One DASD Adapter is standard on the 4321 and provides direct attachment of 3310 #9202, 3370 #9201 and/or 3340/3344 #7851 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 operate in fixed block mode. The 3340/3344 operates in Count-Key-Data (CKD) mode. When using 3340/3344 exclusively system throughput can be degraded by a factor of more than two compared with use of fixed block mode devices.

**Note:** One of the above features must be specified at minimum.

Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string. The maximum number of strings of each type of device on the DASD Adapter is:

1. Up to four 3310 Model A1s or A2s with 3310 Model B units attached, up to a maximum of 4 drives per string.
2. Up to four 3370 Model A1s with 3370 Model B1 units attached, up to a maximum of 4 devices (8 actuators) per string.
3. Up to two 3340 Model A2s with 3340/3344 Model B units attached, up to a maximum of eight drives per string. (3340/3344 Direct Attach feature #7851 is required.) Attachment of 3340/3344 is limited to two strings on the system.

As a transition aid and to allow the use of operating systems and programs which require Count-Key-Data (CKD) direct access storage, the 3340/3344 Direct Attachment and Direct Access Storage (DAS) Compatibility for emulation of 231X on 3310 or 3370 and 3330/3340 on 3370 are available. Operation with DAS Compatibility or the 3340/3344 Direct Attachment features in general will not achieve the same performance as the equivalent devices when attached to S/370 or 4300 processor channels. See performance notes included with the feature descriptions.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344

is limited to the static assignment of a shared string to one processor at a time.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	01	02	03	04	05	06	07
	2A	2B	2C	2D	2E	2F	
	4A	4B	4C	4D	4E	4F	
	6A	6B	6C	6D	6E	6F	
--AND--							
X10	11	12	13	14	15	16	17
	3A	3B	3C	3D	3E	3F	
	5A	5B	5C	5D	5E	5F	
	7A	7B	7C	7D	7E	7F	

With a directly-attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a S/3 Model 12 or 15 -- this is a read-only mode and is available as a conversion aid for users converting to the 4321 Processors from a S/3.

The Direct Access Storage Compatibility feature provides emulation of 231X, 3330 (100Mb/volume) or 3340 data formats on the 3370 Direct Access Storage and the emulation of 231X data formats on the 3310 Direct Access Storage. For address assignment of emulated volumes, refer to "IBM 4321/4331 Processor Compatibility Features (GA33-1528)".

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

**Display/Printer Adapter (Standard):** This adapter allows for attachment of the prerequisite 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C and up to fifteen additional devices chosen from the list below:

- 3178 Display Station
- 3179 Color Display station (base color)
- 3180 Model 1 Display Station \*
- 3191 Display Station
- 3192 Display Station
- 3230 Terminal Printer Model 2 (350/45 cps burst mode)
- 3262 Line Printer Model 1 and 11 (650 and 325 lpm)
- 3268 Printer Model 2 and 2C (340 cps)
- 3278 Display Station Model 2
- 3279 Color Display Station Model 2A
- 3287 Printer Models 1, 2, 1C and 2C (80 and 120 cps)
- 3289 Printer Model 4 (400 lpm)
- 4224 Printers Model 2XX (200/400 cps) (Non-IPDS Mode)
- 4234 Model Dot Band Printer (300 lpm)
- 4250 Printer
- 5210 printer Models G01, G02
- 6580 Displaywriter System Models A4, A6, A8, A10 (25-line display)
- \* The 3081-1 is supported only when it is emulating a 3278 Model 2. The 3180 extended functions or larger screen formats are not supported.

These machines may be installed in any combination, provided that (1) only fifteen devices are installed and (2) no more than two System Printers (3262 and/or 3289) are included. A maximum of two 4250 Printers may be installed. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287/3268/4224/4234 Printer may be used as a console hardcopy device; one or more 3287/3268/4224/4234 Printers may be used as hardcopy workstation devices; one or more 5210s may be used as high quality printers in 3287 mode only. The 3178 Display Station, 3179 Color Display Station (base color); 3180 Model 1 Display Station; 3278 Display Station Model 2; or 3279 Color Display Station

Models 2A, S2A may be used as workstations for user-written applications. The 6580 Displaywriter System emulates a 3278-2 Display Station, and optionally, a 3287-1/2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278-2 and 3287-1/2. Display/Printer Adapter support includes all standard functions of the 3274 Model X1B with the 3178; 3179; 3278 Model 2 or 3279 Models 2A, S2A attached. In addition, the following: 3180 Model 1; 3278 Model 2; or 3279 Model 2A, S2A special features are supported: Keyboard Numeric Lock (standard on the 3178, 3179, or 3180 Model 1), Audible Alarm (standard on the 3178, 3179, 3180 Model 1 or 3279), 3179 Color Display Station (base color), Security Keylock (standard on the 3178, 3179, and 3180 Model 1) and Switched Control Unit (Switched Control Unit is an accessory on the 3179, and 3180 Model 1). Other 3180 Model 1 and 3278 Model 2 or 3279 Model 2A, S2A special features are not supported. When used as workstations, 3180 Model 1 Display Station keyboard feature codes #4600 or #4601 may be selected or on the 3278, or 3279 Display Station keyboard feature codes #4621, #4622, #4623, #4627 may be selected. If two different keyboards are required for a workstation, one must be #4621. Addresses for these devices are selected at installation time from the range 009 through 01F.

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation Adapter (#8332) and Specify #9842 4321 must be ordered for attachment of Displaywriter.

**Diskette Drive (Optional):** A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4321 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below) or a data capacity of 246,272 bytes organized in 1,924 sectors of 128 bytes each (for use in exchanging data with another 4321 Processor). Each Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with DOS/VSE refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and S/1 and S/3, S/32, S/34, and S/38. One diskette is shipped with the feature. Device address is selected at installation time from the range 009 through 01F.

**5424 Adapter (Optional):** Provides native attachment of 5424 Multi-Function Card Unit Models A1 or A2 for 96-column card operations -- Device address is 04C.

**Loop Adapter (Optional):** The Loop Adapter on the 4321 is a native attachment method for the 3640 Plant Data Communications Terminals -- 8775 Display Terminal Models 1 and 2 -- 3287 Printer -- 3274 Control Unit Model 51C and 61C -- 3276 Control Unit Display Station with their associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexibility.

A maximum of two direct attached loops and two data link adapters are supported. Each of the direct attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one IBM 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the IBM 4321/4331 Loop Adapter Programming Guide (SC31-0500-0). User-written programs for loop-attached terminals reside in the 4321 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and

exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4321 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

Terminal initialization  
Terminal re-initialization  
3642 encode check handling  
Transaction selection

Communications network management problem determination support for 4321 loop-attached 8775 Display Terminals, 3276 Display Control Stations and 3274 Model 51C and 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal Models 1, 2 -- 3642 Encoder Printer Models 1, 2 -- 3643 Keyboard Display Model 3, 4 including #4920 Badge and Document Encoder -- 3644 Automatic Data Unit -- 3645 Printer -- 3646 Scanner Control Unit -- 3647 Time and Attendance Terminal -- 8775 Display Terminal Models 1, 2 -- 3287 Printer Models 11, 12 -- 3274 Control Unit Model 51C and 61C -- 3276 Control Unit Display Station Models 11-14 with their associated terminals -- 3843 Loop Control Unit. Device addresses are 040 through 07E.

**8809 Magnetic Tape Unit Adapter (Standard):** Provides native attachment of 8809 Model 1A and up to five additional 8809 tape units (consisting of a mix of 8809 Model 2s and 3s) -- allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for loading or offloading DASD devices or in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read Backward commands are not supported, the Read Backward operation is simulated in the Logical IOCS (MTMOD) of DOS/VSE. Standard channel address is 3. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

**Communications Adapter Base (Standard):** The 4321 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocal unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit Terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For Communications Adapter Base details, see "Communications and Loops" below.

## IBM Stand-Alone Modems

Modems	Speed (bps)	Lines
-----	-----	-----
3833-1	2400	Nonsw voice grade
3834-1	4800	Nonsw voice grade
3863-1,2	2400/1200	Nonsw
3864-1,2	4800/2400	Nonsw
3865-1,2	9600/4800	Nonsw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3868-3,4	9600/4800	Nonsw voice grade
3872-1	2400/1200	Nonsw
3874	4800/2400	Nonsw
3875	3600/7200	Nonsw
5811-10	2400 to 19200	Limited distance modem
5811-18		Rack mount ver-

4321 Processor

5811-20	2400 to 19200	sion of Model 10
5811-28		Nonsw baseband Rack mount version of Model 20
5812-10	2400 to 19200	Nonsw baseband Rack mount version of Model 10
5812-18		Nonsw voice grade Rack mount version of 5865-2
5865-2,3	9600/7200/4800	Nonsw voice grade Rack mount version of 5866-1,2
5868-52		
5866-2,3	14400/9600	
5868-62		

(Canada only) The following modems are supported with the Switched Network Backup feature -- see M3863, 3864, 3865, 3872, 5865 and 5866 pages for details:

Modems	Speed (bps)	Lines
-----	-----	-----
3863-1,2	2400/1200	Nonsw voice grade
3864-1,2	4800/2400	Nonsw voice grade
3865-1,2	9600/4800	Nonsw voice grade
3872-1	2400/1200	Nonsw voice grade
5865-2,3	9600/7200/4800	Nonsw voice grade
5866-2,3	14400/9600	Nonsw voice grade

Note: Only 4-wire SNBU is supported by 5865 and 5866 modems.<

**Non-IBM Modems:** Non-IBM modems that comply with EIA RS 232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

**Automatic Calling Equipment:** The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- Other Automatic Calling Equipment which complies with EIA RS 366 or CCITT V.25 may be connected to the Autocal Unit Interface (#1020) under the provisions of the IBM Multiple Supplier Systems Bulletin.

## SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.
- 4250 Printer Attachment: Specify #9260 for 4250 attachment.
- 6580 Displaywriter Attachment: Specify #9842 for 6580 attachment.
- Specify #9841 on 4321 must be ordered for attachment of 3268 or 4234 Model 1 to the 4321. Provides microcode and/or maintenance documentation if machine is below EC 366585 (microcode for 4321) and/or below EC 366584 (maintenance documentation) for all Models.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4321 Processor. It provides service personnel the capability of remotely controlling the 4321 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection

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of the telephone interface cable provided by IBM to the telephone network.

- **Remote Operator Console Facility (ROCF):** This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4321 manual control functions for a remote 4321 via a real\* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4321 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4321 are suppressed when ROCF is in use. Field Installation: Yes.

\* 3275 Model 2 can only be obtained on an "as available" basis.

- **Loop-Attached Terminals:** The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274 (Model 51C or 61C) and/or 3276 Control Units are attached to the system via Loop Adapter 1 and/or 2 (#4830, #4831) and/or Data Link Adapters (#4840).

Specify	Selected Terminals
#9251	3641 Reporting Terminal/3647 Time and Attendance Terminal
#9252	3642 Encoder Printer
#9253	3643 Keyboard Display
#9254	3644 Automatic Data Unit (ADU)
#9256	3646 Scanner Control Unit
#9257	8775 Display Terminal 3287/3645 Printer 3274 (Model 51C or 61C) and 3276 Control Unit and 3104 Display Terminal
#9258	3643 Keyboard Display with #4920

- **Console Table:** A console table is available -- see #1550 or the 4331-1 Accessories Section for details. Book Rack and Cable Holder -- see #1480 or the 4331-1 "Accessories".
- See 3278 Display Console Model 2A or 3279 Color Display Console Model 2C for console cabling.

## SPECIAL FEATURES

### Note:

%x: Denotes feature supplies diskette for System Diskette facility.

%z: Denotes System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette.

**Adapter Power Prerequisite (#1001):** Provides power and control circuitry necessary for the Communications Adapter, (when more than three line features are attached), and the Adapter Logic. Maximum: One. Field Installation: Yes. Prerequisites: #1002 or for the Loop Adapter (#4830) and/or Communication Adapter with more than three line attachments #4695 and/or #4696.

**Adapter Logic Prerequisite (#1002):** Provides logic and control function necessary for the 5424 Adapter (#3901). Maximum: One. Field Installation: Yes. Prerequisites: #1001.

**Block Multiplexer Channel (#1421):** Provides means of attaching I/O devices. Up to 8 control units may attach to each channel. Disconnect during command chaining allows multiple I/O devices to operate concurrently. 231X as well as 3830 and 3880 Control Units with associated DASD do not attach. See DASD Adapter for attachment of 3340/3344/3310/3370 devices. Data transfer rates up to 0.5 million bytes per second. Maximum: One. Field Installation: Yes. Pre-

requisites: For certain control units/devices the processor requires Power Interface (#5531, #5532). See Table 4.

**Microcode Storage Requirements:** The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, use the following procedure.

Note: An interactive HONE aid is available dependent on the control program or program product device support to facilitate this procedure.

1. Consulting Table 2, determine the microcode groups required to support the features and I/O to be installed.
2. On Table 3, place a checkmark in the appropriate rows. Note that each microcode group is required only once, even if it supports multiple functions of the 4321 Processor. The only exception to this is microcode group 2 where 2,048 bytes of Processor Storage are required per megabyte of virtual storage as defined in the Table 3 notes.
3. Find the sum of each of the two columns for the required microcode groups.
4. The total from Column A must pass the test: When the total from Column A exceeds 262,144 bytes, an invalid configuration has been selected. See the Note below.
5. Add the total of column A to the total from Column B, subtract control storage of 131,072 bytes and round up to the next multiple of 4,096 bytes.

The results of Step 5 determine the amount of Processor Storage occupied by microcode and should be subtracted from the Processor Storage size ordered to determine the amount available for the user. The storage for Group 7 specified in Column B (DAS Compatibility #7901) is only occupied if the feature is activated at IPL time.

Note: Too many features/options have been selected. Inspect Tables 2 and 3 and determine which feature(s) of lower priority should be deleted from the configuration.

TABLE 2

Function/ Feature Installed	Micro- code Group
4321 Processor	1
Processor Storage	2
3310 attached (#9202)	3
3370 attached (#9201)	4
3340/3344 Direct Attach (#7851)	5,6
Direct Access Storage Compatibility (#7901)	5,7
BSC lines installed (#9671-#9678)	8
S/S lines installed (#9681-#9688)	9
SDLC lines installed (#9691-#9698)	10

Note: The Microcode Group 1 contains 4321 Processor standard hardware features. For details, see "Highlights".

TABLE 3

--

Micro code Group	- A - Control Storage or Pro- cessor Storage	- B - Pro- cessor Storage (only)	Notes
1	187392	49152	
2	-	2048	In S/370 mode or for each 1Mb of vrtl storage in ECPS: VSE mode, in steps of 2,4,8, 16Mb.
3	4608	11250	
4	9316	10000	
5	5760	200	
6	22528	11600 8800 1800	Plus Per 3340 buffer For a second string of 3340s attached to the DASD adapter.
7	27648	1300 4096 7680 13312 8704	Plus Per 2311 buffer Per 2314 buffer Per 3330 buffer Per 3340 buffer
8	6144	-	
9	5120	-	
10	9216	1024	

**DASD Adapter (Standard):** Allows attachment of the 3310, 3370 and 3340/3344 DASD to the 4321 Processor. Up to four strings of devices may be attached to each adapter. The attachable device types may be intermixed on each adapter but not within a string. The maximum number of strings of each type of device on each DASD Adapter is:

- Up to four 3310 Model A1s or A2s with 3310 Model B units attached, up to a maximum of 4 drives per string.
- Up to four 3370 Model A1s with 3370 Model B1 units attached, up to a maximum of 4 devices (8 actuators) per string.
- Up to two 3340 Model A2s with 3340/3344 Model B units attached, up to a maximum of eight drives per string - (3340/3344 Direct Attach feature #7851 is required). Attachment of 3340/3344 is limited to two strings on the system.

**String Switch Capability** allows sharing of 3340 Model A2 and/or 3370 Model A1 and associated drives with another IBM processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340 Model A2 or 3370 Model A1 must have the String Switch feature #8150 installed. String switch support for 3340/3344 is limited to the static assignment of a shared string to one processor at a time. For data rate and attachment limitations for other devices and communications lines refer to "IBM 4321/4331 Processor Channel Characteristics" (GA33-1527), which contains tables of pre-analyzed configurations. Prerequisites: 3340/3344 requires #7851 - see Table 2 for microcode storage requirements. Specify: #9202%z if 3310 and/or #9201%z if 3370 attaches to the DASD Adapter. #9316 if String Switch Capability is required with 3370.

**Diskette Drive (#3401):** A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. Limitations: Not supported by VM/SP. Maximum: One. Field Installation: Yes.

**External Signals (#3896):** Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. Maximum: One. Cable Order: Required. Field Installation: Yes. Prerequisites: External Devices must meet the interface specifications outlined in S/360 Direct Control Feature OEMI (GA22-6845).

**5424 Adapter (#3901%x):** Allows attachment of one 5424 Multi-Function Card Unit Model A1 or A2. Limitations: The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter (#4830). Maximum: One. Field Installation: Yes. Prerequisites: #1001 and #1002.

**Byte Multiplexer Channel (#5248):** The byte multiplexer channel attaches S/370 byte multiplex devices. The data rate of the channel is up to 18K bytes per second in single byte interleaved mode and up to 500K bytes per second in burst mode. For data rates achievable for specific configurations, see "IBM 4321/4331 Channel Characteristics" (GA33-1527). Up to eight control units may be attached. See Input/Output Attachments section above for details on sub-channels. Maximum: One. Field Installation: Yes. Prerequisites: For certain control units/devices, the processor requires Power Interface (#5531, #5532). See Table 4.

**Power Interface (#5531), Add'l (#5532):** Provides power control to the 4321 Processor for control units attaching to the 4321 Byte Multiplexer Channel and Block Multiplexer Channel. Table 4 below lists the control units/devices for which this feature must be installed in the 4321 Processor - Power Interface (#5531) allows attachment of up to eight of these control units; Power Interface, Add'l (#5532) allows attachment of eight additional control units for a maximum of 16 per processor. Maximum: One of #5531; one of #5532. Field Installation: Yes. Prerequisites: #5532 requires #5531.

TABLE 4

## Control Units/Devices Requiring Power Interface Features

- Mandatory:
  - 1255 Magnetic Character Reader
  - 1287 Optical Reader
  - 1288 Optical Reader
  - 1419 Magnetic Character Reader
  - 1442 Card Read Punch Model N1
  - 1442 Card Punch Model N2
  - 1443 Printer Model N1
  - 2415 Magnetic Tape Unit and Control
  - 2501 Card Reader Model B1 and B2
  - 2520 Card Read Punch Model B1, B2, B3
  - 2701 Data Adapter Unit
  - 2702 Transmission Control\*
  - 2703 Transmission Control\*
  - 2803 Tape Control
  - 2821 Control Unit Mdls 1,2,3,5 and 6
  - 2822 Paper Tape Reader Control\*
  - 2840 Display Control\*
  - 3272 Control Unit
  - 3411 Magnetic Tape Unit and Control
  - 3505 Card Reader
  - 3540 Diskette Input/Output Unit
  - 3704 Communications Controller
  - 3705 Communications Controller
  - 3791 Controller
  - 3800 Printing Subsystem
  - 3803 Tape Control
  - 3811 Printer Control Unit
  - 3881 Optical Mark Reader Model 1

3886 Optical Character Reader Model 1  
3890 Document Processor  
3895 Document Reader/Inscriber

2 - Not Mandatory, but can utilize  
Power Interface features:

3274 Control Unit  
3340 Direct Access Storage Facility  
3370 Direct Access Storage  
3203 Printer Model 5

\* No longer available

**3340/3344 Direct Attachment (#7851%z):** A feature allowing 3340 Model A2s to attach to a DASD Adapter. Up to two 3340 Model A2s per system may attach to either adapter. Up to three 3340/3344 Model B units may attach to each 3340 Model A2. S/3 Data Import: With the VSE/IBM System/3-3340 Data Import utility program (5746-AM3), 3348 Data Modules which have been written on a 3340 attached to a S/3 can be read on any directly-attached 3340 drive. The String Switch Capability allows sharing of 3340 Model A2 drives (with #8150 installed) and associated drives, with another IBM processor or control unit that supports the DASD and string switching. String switch support is limited to the static assignment of a shared string to one processor at a time. Limitations: (1) Attachment of 3340/3344 and/or use of the DAS Compatibility is limited to two strings on the system. (2) If one string of 3340/3344s is attached to a DASD Adapter (#3201), only one string of 3310/3370s can perform DASD emulation. If two strings of 3340/3344s are attached, no 3310/3370s can perform DASD emulation. Maximum: One. Field Installation: Yes. Prerequisites: 3340 Model A2. See Table 2 for microcode storage requirements. Specify: #9315 if String Switch Capability for 3340 required, #9317 if 3344 is installed.

Note: Use of this feature introduces additional processor and channel demands, and can have a significant effect on system performance, particularly in batch environments with heavy I/O load and/or if multi-track operations are used. Performance considerations should be carefully reviewed before proposing use of the 3340/3344.

**Direct Access Storage Compatibility (#7901%z):** Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100Mb/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 mode under VM/SP, in ECPS/VSE mode under DOS/VSE. Under DOS/VSE data sets in fixed block format and in emulated format can co-reside on the same 3310/3370 volume. With DOS/VSE, a variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With VM/SP partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

Compatibility Type	Max Number of Emulated Full Volumes		
	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63

3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to "IBM 4321/4331 Compatibility Features" (GA33-1528).

**Performance Note:** Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

**Limitations:** (1) Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. (2) Operation of emulation and directly-attached 3340/3344 is limited to two strings on the system. (3) One type of emulation can be activated at IPL time. (4) 3330 Model 11 cannot be emulated. (5) Emulation cannot be used on 3370 drives which are shared via a string switch. (6) VM/SP supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/SP or CMS. Emulated 2311 is not supported by VM/SP. Program Order: The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, 5745-030 or combined with VSE/Advanced Functions and VM/SP (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. Maximum: One. Field Installation: Yes. Prerequisites: 3370 (#9201) and/or 3310 (#9202) specification. See Tables 1 and 2 for microcode storage requirements.

## COMMUNICATIONS and LOOPS

**Communications Adapter Base (Standard):** Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1527. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to bps and may operate concurrently with other lines provided the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/SP.

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to eight line features without internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) with clock.
- Up to eight line features with internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) without clock.
- One synchronous high-speed line feature.
- Up to eight line features with integrated modems.
- Up to eight line features with local attachments.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half-speed operation for synchronous lines only (for both clocked and non-clocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the CE:

- Duplex instead of half-duplex connection (2-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High-speed operation for one line (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

Limitations: (1) SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/SP with DOS/VSE running as a guest. (2) Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. (3) The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one, capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines refer to "IBM 4321/4331 Processor Channel Characteristics" (GA33-1527), which contains tables of pre-analyzed configurations. Prerequisites: #1001 is required when more than three telecommunications line features are attached. See Table 2 for microcode storage requirements. Specify: See Table 5 "Communications Adapter Configuration Features and Position Codes", for required specify codes for each line feature attached.

**Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communications facilities and services.

**Communication Facilities:** See M2700 pages for communications facility requirements with this feature.

## TERMINALS SUPPORTED

The Data Communications Equipment and remotely attachable Data Terminal Equipment (abbreviated "terminals") supported by the Communications Adapter are shown in the table below:

SDLC Terminals Supported:

Type	Speed in K bps				
Terminals:					
3271-11,					
-12 (3)	X	X	X	X	X
3274-					
X1C (8)		X	X	X	X
3276-1,					
-4 (7)	X	X	X	X	X
3275-					
12 (3)	X	X	X	X	X
3276-					
11, -14	X	X	X	X	X
3601	X	X	X	X	X
3602	X	X	X	X	X
3614	X	X	X	X	X
3624	X	X	X	X	X

3631	X	X	X	X	X
3632	X	X	X	X	X
3651-					
25, -75		X	X	X	X
3651-					
A50, -B50		X	X	X	X
3651-					
A60, -B60		X			
3661				X	
3684	X	X	X	X	X
3694	X	X	X	X	X
3767-					
1, -3	X	X	X		
3771-					
1, -3	X	X	X	X	X
3773-					
1, -3	X	X	X	X	X
3773-					
P1, -P3	X	X	X	X	X
3774-					
1, -2	X	X	X	X	X
3774-					
P1, -P2	X	X	X	X	X
3775-					
1, -P1	X	X	X	X	X
3776-					
1, -2		X	X	X	X
3776-					
3, -4		X	X	X	X
3777-					
1, -3		X	X	X	X
3791	X	X	X	X	X
3791/					
3730	X	X	X	X	X
3791/					
3760	X	X	X	X	X
4701-1	X	X	X	X	X
4736	X	X	X	X	X
6670		X	X	X	X
7426 (4)	X	X	X	X	X
8775-					
11, -12 (4)	X	X	X	X	X

Controllers:

3705 (1)	X	X	X	X	X
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Systems:

4331 (2)	X	X	X	X	X
5285 (9)	X	X	X	X	X
5288 (9)	X	X	X	X	X
5320 (5)	X	X	X	X	X
5340 (6) (9)	X	X	X	X	X
5360 (6) (9)	X	X	X	X	X
5362 (6) (9)	X	X	X	X	X
5380 (5)	X	X	X	X	X

Type	Speed in K bps			
Terminals:				
3271-11,				
-12 (3)	X	X	X	
3274-				
X1C (8)	X	X	X	X
3276-1,				
-4 (7)	X	X	X	
3275-				
12 (3)	X	X	X	
3276-				
11, -14	X	X	X	
3601	X	X	X	
3602	X	X	X	
3614				
3624				
3631	X	X	X	

3632	X	X	X	
3651-				
25, -75				
3651-				
A50, -B50				
3651-				
A60, -B60				
3661				
3684				
3694	X	X	X	
3767-				
1, -3				
3771-				
1, -3				
3773-				
1, -3				
3773-				
P1, -P3				
3774-				
1, -2				
3774-				
P1, -P2				
3775-				
1, -P1				
3776-				
1, -2				
3776-				
3, -4	X	X	X	X
3777-				
1, -3	X	X	X	X
3791	X	X	X	
3791/				
3730	X	X	X	
3791/				
3760	X	X	X	
4701-1	X	X	X	
4736	X	X	X	
6670	X	X	X	
7426 (4)	X	X	X	
8775-				
11, -12 (4)	X	X	X	X

Controllers:

3705 (1)	X	X	X	X
----------	---	---	---	---

Systems:

4331 (2)	X	X	X	X
5285 (9)				
5288 (9)				
5320 (5)	X	X		
5340 (6) (9)	X	X	X	X
5360 (6) (9)	X	X	X	X
5362 (6) (9)	X	X	X	X
5380 (5)	X	X	X	

Notes:

- 3705 supported as a primary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
- Participant as a primary or a secondary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
- Not supported by ACF/VTAME.
- DSLU (5668-006) is required for 7426 or 8775-11, -12 with downstream loadable functions.
- Supported as a 3770.
- Supported as a 3770 or 3791.
- With SDLC/BSC Switch in SDLC mode.
- The maximum speed supported is 56K bps.
- Supported as a 3274 Model 1C or 3770

BSC Terminals Supported

Type Speed in K bps

Terminals:

2715-2		X	X	X	X
3271-1, -2	X	X	X	X	X
3274-X1C		X	X	X	X
3275-2 (1)	X	X	X	X	X
3276-1, -4	X	X	X	X	X
3631 (7)	X	X	X	X	X
3632 (7)	X	X	X	X	X
3651-25, -75		X	X	X	X
3651-A50,		X	X	X	X
-B50		X	X	X	X
3651-A60,					
-B60		X			
3661		X			
3684-1, -2	X	X	X	X	X
3741-2, -4	X	X			
3747	X	X			
3771 (2)	X	X	X	X	X
3773-1,					
-3 (2)	X	X	X	X	X
3773-P1,					
-P3 (2)	X	X	X	X	
3774,					
3775 (2)	X	X	X	X	X
3776-1,					
-2 (3)		X	X	X	X
3777-1,					
-2 (3)		X	X	X	X
3780	X	X	X	X	X
4701-1	X	X	X	X	X
5110 (12)	X	X	X	X	X
5231-2 (9)	X	X	X	X	X
5285	X	X	X	X	X
5288 (13)	X	X	X	X	X
5937 (11)	X	X	X	X	X
6670	X	X	X	X	X

Controllers:

2701					
(w 360/370)	X	X	X	X	X
3704	X	X	X	X	X
3705	X	X	X	X	X

Systems: (5)

3115	X	X	X	X	X
3125	X	X	X	X	X
3135	X	X	X	X	X
3138	X	X	X	X	X
4331	X	X	X	X	X
5010 (8)	X	X	X	X	X
5285 (14)	X	X	X	X	X
5288 (14)	X	X	X	X	X
5320 (8)	X	X	X	X	X
5340 (8) (14)	X	X	X	X	X
5360 (8) (14)	X	X	X	X	X
5362 (8) (14)	X	X	X	X	X
5404	X	X	X	X	X
5406	X	X	X	X	X
5408	X	X	X	X	X
5410	X	X	X	X	X
5412	X	X	X	X	X
5415	X	X	X	X	X
8100 (4)	X	X	X	X	X
S/1 (8)	X	X	X	X	X

Terminals:

2715-2					
3271-1, -2	X	X	X		
3274-X1C	X	X	X		
3275-2 (1)	X	X	X		
3276-1, -4	X	X			
3631 (7)	X	X	X		
3632 (7)	X	X	X		

3651-25, -75

3651-A50,  
-B50

3651-A60,  
-B60

3661

3684-1, -2

3741-2, -4

3747

3771 (2)

3773-1,

-3 (2)

3773-P1,

-P3 (2)

3774,

3775 (2)

3776-1,

-2 (3)

3777-1,

-2 (3)

3780

4701-1

5110 (12)

5231-2 (9)

5285

5288 (13)

5937 (11)

6670

## Controllers:

2701

(w 360/370)

3704

3705

## Systems: (5)

3115

3125

3135

3138

4331

5010 (8)

5285 (14)

5288 (14)

5320 (8)

5340 (8) (14)

5360 (8) (14)

5362 (8) (14)

5404

5406

5408

5410

5412

5415

8100 (4)

S/1 (8)

## Note:

1. By RPQ.
2. Equivalent to 2770/2772.
3. Equivalent to 2770/3780.
4. Supported as a 3276 Model 1, 2, 3, 4, nonswitched connection only.
5. With Communications Adapter.
6. 19,200 - bps in line position 1.
7. See M3631 and/or 3632 pages for 3631/3632 features required and software requirements for host connection.
8. Equivalent to 54XX (S/3).
9. Equivalent to 3741 Model 2, 4.
10. Equivalent to 3275 Model 1, 2.
11. Equivalent to 3271 Model 1, 2.
12. Supported as a 2772.
13. Supported as 3280
14. Supported as a 3271 Model 2.

**Start/Stop Terminals Supported:** Only terminals using IBM Terminal Control - Type 1 are supported.

## IBM I Line Control Speed (bps)

TYPE	75	134.5	300	600	1200
2740-1		X			
2740-2	X	X		X	
2741		X			
3767-1 (1)		X	X	X	X
3767-2 (1)		X	X	X	X
3767-3 (1)		X	X	X	X
5100 (2)		X	X		
5110		X	X		
CMCST (1)		X	X		

1. Equivalent to 2740 and/or 2741: Speed 134.5 bps needs 3767 RPQ

2. Equivalent to 2741.

**Autocall Unit Interface (#1020%x):** Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS 366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. Limitations: Does not operate with High-Speed Modem Adapter (#4720), any features with 1200 bps Integrated Modem or with any nonswitched lines. Maximum: Two. Field Installation: Yes. Prerequisites: #3701 (in switched operation) for each Autocall Unit Interface installed. Specify: Line position, see Table 5 below.

**EIA/CCITT Interface (#3701%x):** This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems (#4696), then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. Maximum: Eight. Field Installation: Yes. Prerequisites: One #4695 or #4696 is required for each feature #3701 installed. Specify: Start/Stop, SDLC and/or BSC operations are possible. See Table 5 for Line Position Code and Transmission Mode Codes.

**Loop Adapter:** Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 8775 Models 1, 2 and 3287 Models 11, 12 and/or Control Units 3274 Model 51C and 3276 Models 11-14 with the associated terminals to the 4321 Processors. Loop Adapter 1 and 2 (#4830, #4831) provide for direct attachment. A maximum of two Data Link Adapters (#4840) provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter (#4840) can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct attached loops at 9600 bps or data link attached loops at 2400, 4800 or 9600 bps are the following:

## Device Attachments

3641 Reporting Terminal Models 1, 2  
3642 Encoder Printer Models 1, 2  
3643 Keyboard Display Models 3, 4 including #4920 Badge and Document Encoder  
3644 Automatic Data Unit  
3645 Printer  
3646 Scanner Control Unit

3647 Time and Attendance Terminal  
8775 Display Terminal Models 1, 2  
3287 Printer Models 11, 12  
3274 Control Unit Models 51C, 61C with the associated terminals  
3276 Control Unit Display Station Model 11-14 with the associated terminals

## Control Units and Associated Terminals

3274 Control Unit Model 51C, 61C  
3178 Display Station  
3179 Color Display Station  
3180 Model 1 Display Station  
3278 Display Station  
3279 Color Display Station  
3262 Line Printer  
3268 Printer Model 2, 2C  
3287 Printer  
3289 Line Printer  
5210 printer Models G01, G02  
6580 Displaywriter System, Model A4, A6, A8, A10 (25-line display)  
6580 Displaywriter System, Model B4, B6, B8, B10 (66-line display)  
3276 Control Unit Display Station Model 11-14  
3178 Display Station  
3179 Color Display Station  
3180 Model 1 Display Station  
3278 Display Station  
3279 Color Display Station  
3262 Line Printer  
3268 Printer Model 2, 2C  
3287 Printer  
3289 Line Printer  
4234 Model 1 Dot Band Printer  
6580 Displaywriter System, Model A4, A6, A8, A10 (25-line display)  
6580 Displaywriter System, Model B4, B6, B8, B10 (66-line display)

In addition the following devices can be attached at 38,400 bps:

8775 Display Terminal Models 1, 2  
3287 Printer Models 11, 12  
3274 Control Unit Model 51C with the associated terminals

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link attached loops see 3843 Loop Control Unit. For details refer to "IBM Multi-use Communications Loop Planning Guide" (GA23-0038).

**Loop Installation:** For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the "IBM Multi-use Communications Loop Planning Guide" (GA23-0038), and Installation Guide (GA23-0039). The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to "IBM 4321/4331 Processor Loop Adapter Feature, Operating Procedures" (GA33-1538), and "Problem Determination Procedures" (GA33-1540).

## Notes:

1. Loop Accessories are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See

M4331-1 "Accessories" section for details and ordering information.

2. An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N 1657320.

**Communications Facilities:** See M2700 pages for communications facility requirements.

**Loop Adapter 1 (#4830):** Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 8775 and/or 3287 terminals and/or 3274 (Model 51C or 61C) and/or 3276 Control Units or 38.4K bps for 8775 and/or 3287 terminals and/or 3274 (Model 51C or 61C) Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: One. Field Installation: Yes. Prerequisites: Adapter power prerequisite (#1001).

**Loop Adapter 2 (#4831):** Provides for direct attachment of a Loop with one or two Lobes (A lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 8775 and/or 3287 terminals, and/or 3274 (Model 51C or 61C) and/or 3276 Control Units, or 38.4K bps for 8775 and/or 3287 terminals and/or 3274 (Model 51C or 61C) control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: One. Field Installation: Yes. Prerequisites: #4830.

**Data Link Adapter (#4840):** Allows connection of one or more 3843 loop control units to the 4321 processor. The feature provides for the attachment of one external modem complying with EIA/ CCITT. support will be provided for nonswitched lines only Transmission speed can be 2400, 4800, or 9600 bps, with half-speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link attached loops. Support will be provided for the same terminals as on the direct attached loop. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: Two. Field Installation: Yes. Prerequisites: #4830.

**Loop Adapter Logic Storage Requirements:** The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 (#4830, #4831) or Data Link Adapters (#4840) has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple		
3641 and/or 3647	7800	1060
One or multiple		
3642	5900	580
One or multiple		
3643 w/o #4920	8800	3450
One or multiple		
3643 w/#4920	9400	3450
One or multiple		
3644	4900	-
One or multiple		
3646	2900	256
One or multiple		
8775 and/or 3287, 3274, 3276, 3645	2600	-

Terminal\*  
Control

		Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	-----	-----
Total 1	Total 2	

\*For additional information on buffer space refer to the "IBM 4321/4331 Loop Adapter Characteristics" (GA33-1534).

The storage requirements need to be validated by DP because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

**System Diskette Space Requirements:** When attaching the Loop Adapter feature with 364X terminals to the 4321 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3,876, an invalid configuration has been selected. A trade-off between features must be considered.

4321 Processor Feature/Facility	System Diskette Records
4321 Basic	2854
3310 Att. (#9202)	66
3370 Att. (#9201)	70
3340/3344 Direct Att. (#7851)	120
3340 Att. or DAS Compatibility (#7851 or #7901)	24
DAS Compatibility (#7901)	170
Start/Stop	
Transmission Mode (#968X)	20
BSC Transmission Mode (#967X)	24
SDLC Transmission Mode (#969X)	52
364X Terminal Att. (#9251, #9252, #9253, #9254, #9256)	665

The maximum number of system diskette records may not exceed 3876.

**Maximum Terminal Attachments:** The maximum number of terminals that can be attached to the 4321 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 8775 terminals or 3274 (Model 51C or 61C) or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see "IBM Multi-use Communications Loop Planning Guide" (GA23-0038).

**Line Attachment Base For Clocked Modems (#4695%):** This feature is a prerequisite for all line adapters which attach to modems (Data Circuit Terminating Equipment) which provide clocking and comply with CCITT V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network. See the various line features below to determine when it is required. Limitations: A maximum of eight Line Attachment Bases may be installed on 4321 Communications Adapter. Each feature #4695 in-

stalled reduces by one the number of feature #4696 allowable. Maximum: Eight, one per line installed. Field Installation: Yes. Prerequisites: #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

**Line Attachment Base For Nonclocked Modems (#4696%):** This feature is a prerequisite for all line adapters which attach to modems (Data Circuit Terminating Equipment) which do not provide clocking. See the various features below to determine when it is required. The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

- Start/Stop: 75, 300, 600, or 1200 bps.
- BSC: 600 bps.
- SDLC: 600 bps.

For BSC or SDLC operations, if 1200 bps is wired, then full-speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. Limitations: A maximum of eight Line Attachment Bases may be installed on 4321 Communications Adapter. Each feature #4696 installed reduces by one the number of feature #4695s allowable. Maximum: Eight, one per line installed. Field Installation: Yes. Prerequisites: Feature #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

**High-Speed Modem Adapter (#4720%):** Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to bps. Limitations: For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see "IBM 4321/4331 Channel Characteristics" (GA33-1527). Cannot be installed with X.21 Adapter for Nonswitched Networks (#5655) if its speed is 48,000 bps #9831. Maximum: One. Field Installation: Yes. Prerequisites: #4695. Specify: BSC and/or SDLC operations are possible -- see Table 5 for Line Position Code and Transmission Mode Codes.

**Local Attachment Interface (#4801%):** Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the Customer Engineer at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

- 800 meters at 1200 bps
- 400 meters at 2400 bps
- 200 meters at 4800 bps
- 100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. Cable Order: Customer-supplied cable for in-door use. Maximum: Eight. Field Installation: Yes. Prerequisites: #4695. Specify: SDLC and/or BSC operations are possible, see Table 5.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. Limitations: If feature #5655 operates at 48,000 bps (specify #9831), then the following limitations apply: (1) High-Speed Modem Adapter (#4720) cannot be installed -- (2) For speed limitations, refer to the Communications Adapter Base feature description. Maximum: Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. Field Installation: Yes. Prerequisites: One #4695 is required for each #5655 installed. Specify: SDLC operation must be specified for this feature -- see Table 5 for line position, trans-

mission mode and transmission speed codes. Note: #9831% x is required for 48,000 bps operation.

**Table 5**  
Communications Adapter Configuration Feature  
And Position Codes

Feature Number %x	Required Line Att Base %x	1 %z	2 %z	Line Positions with Line Position Codes					7 %z	8 %z
		3 %z	4 %z	5 %z	6 %z					
EIA/CCITT Interface (for clocked modems):										
3701	4695	9531	9532	9533	9534	9535	9536	9537	9538	
EIA/CCITT Interface (for Non-Clocked Modems):										
3701	4696	9521	9522	9523	9524	9525	9526	9527	9528	
High-Speed Modem Adapter:										
4720	4695	9501								
1200 bps Integrated Modems:										
X.21 Adapter for Nonswitched Networks for 2400-9600 bps										
5655	4695	9711	9712	9713	9714	9715	9716	9717	9718	
for 48,000 bps		9831								
Local Attachment Interface										
4801	4695	9451	9452	9453	9454	9455	9456	9457	9458	
Autocall Unit Interface (3) First										
1020		9541	9542	9543	9544	9545	9546	9547	9548	
Second		9551	9552	9553	9554	9555	9556	9557	9558	
Transmission Mode (5) BSC (1)										
		9671	9672	9673	9674	9675	9676	9677	9678	
Start/Stop (2)		9681	9682	9683	9684	9685	9686	9687	9688	
SDLC (1)		9691	9692	9693	9694	9695	9696	9697	9698	

**Notes:**

- BSC or SDLC transmission mode with any line attachment feature.
- Start/Stop transmission mode only with EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696) or with any other features offering 1200 bps Integrated Modems (with prerequisite #4696).
- Must be associated with EIA/CCITT Interface (#3701 and prerequisite #4695 or #4696). Maximum of two #1020s may be installed.
- The aggregate data rate of the Communications Adapter is 64,000 bps -- Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage -- see Table 2 for microcode storage requirements.
- When changing #9444 to/from #9471, no new hardware or diskette is required.

%x Feature supplies diskette for System Diskette facility.

%z System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette.

**MODEL CONVERSIONS**

\* MODEL UPGRADES FROM 4321 TO 4331 and 4361 ARE NO LONGER AVAILABLE.

Customer price quotations and customer order acknowledgement letters for purchase machine conversion must state: "Installation of this machine model conversion involves the removal of parts which become the property of IBM".

Field upgrade from 4321 to 4331 Model Group 2 is possible. After the upgrade the machine type of the 4321 is changed to 4331 Model Group 2 by the CE. Downgrades to 4321 from 4331 is not recommended for field installation. Refer to "Equipment Orders" in the GI section for details of this "Not Recommended for Field Installation".

The 4321 type conversion to a 4331 Model Group 2 has a one year service and parts warranty on those components provided by IBM with the type conversion.

**ACCESSORIES**

See M4331-1 "Accessories" for additional information and field installation of Console Table (#1550), Book Rack and Cable Holder (#1480) and Loop Accessories and Loop Cables.

**SUPPLIES (NONE)**

## 4331 PROCESSOR MODEL GROUPS 1, 2

(NO LONGER AVAILABLE)

- | The 4331 is no longer available. No new RPQs will be accepted.
- | \* UPGRADES FROM 4321/4331 TO 4361 PROCESSORS ARE NO LONGER AVAILABLE.

THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT

### PURPOSE

Provides the power, control, logic and storage circuitry necessary for the arithmetic, logic and processor storage functions of the 4331 Processor models.

### MODEL GROUPS 1, 2

#### 4331-MG 1

**Model I1 I01:** 524,288 bytes of Processor Storage -- no Buffer Storage.

**Model J1 J01:** 1,048,576 bytes of Processor Storage -- no Buffer Storage.

#### 4331-MG 2

**Model J2 J02:** 1,048,576 bytes of Processor Storage -- 8,192 bytes of Buffer Storage.

**Model K2 K02:** 2,097,152 bytes of Processor Storage -- 8,192 bytes of Buffer Storage.

**Model KJ2 KJ2:** 3,145,728 bytes of Processor Storage -- 8,192 bytes of Buffer Storage.

**Model L2 L02:** 4,194,304 bytes of Processor Storage -- 8,192 bytes of Buffer Storage.

For clarity, a separate product description is provided for Model Group 11. Tables of supported communications equipment included in this page set are common for all 4331 Models.

**Maximum Configuration:** The maximum number of DASD/8809 Adapters and Byte and/or Block Multiplexer Channels which are available are shown below:

4331 Model Group 1	Maximum
DASD Adapter	1
8809 Adapter	1
Byte Multiplexer Channel	1
Block Multiplexer Channel	1

4331 Model Group 2	Options (select 1 column)		
DASD Adapter	1	1	1
DASD Adapter, Add'l	1	1	-
8809 Adapter	1	-	-
Byte Multiplexer Channel	1	1	1
Block Multiplexer Channel	1	1	1
Block Multiplexer Channel, Add'l	-	1	1
High-Speed Block Multiplexer Channel	-	-	1

The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to "IBM 4331

Processor Channel Characteristics", GA33-1527 (Model Group 1) or GA33-1535 (Model Group 2), which contains comprehensive tables of pre-analyzed configurations.

**Prerequisites:** Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console Model 2A or a 3279 Color Display Console model 2C with keyboard is required for this purpose.

### HIGHLIGHTS

Depending on the model, the processor can contain up to 4,194,304 bytes of monolithic processor storage. Storage is high-density single-bit cell design. Data flow is four bytes parallel. Processor storage cycles are model dependent. The 4331 Model Group 1 storage fetch cycle is 900 nanoseconds for four bytes and the store cycle is 1,300 nanoseconds for four bytes. The 4331 Model Group 2 fetch and store cycles for the buffer are each 200 nanoseconds for four bytes. Buffer storage is automatically replenished from processor storage in 64-byte units at a time. The 64 byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.1 microseconds. The processor is microcode-controlled.

**Note:** The microcode which controls system operations resides in both Processor Storage and Reloadable Control Storage, reducing the Processor Storage available for user programming. For 4331 Model Group 1 without the optional Control Storage Expansion feature installed, Processor Storage available for the user is reduced from that installed by at least 53,248 bytes. For 4331 Model Group 1 with the optional Control Storage Expansion feature installed or 4331 Model Group 2, Processor Storage is reduced from that installed by at least 16,348 bytes (4331 Model Group 2 includes 131,072 bytes of Control Storage). Table 1 below lists the storage requirements for system microcode.

### Standard Functions

- For 4331 Model Group 1 -- 524,288 bytes or 1,048,576 bytes of processor storage. For 4331 Model Group 2 -- 1,048,576 bytes to 4,194,304 bytes of processor storage. 4331 Processor configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 for details.
- ECPS:VSE mode or S/370 mode. In S/370 mode, both Extended Control (EC) and Basic Control (BC) are available. The 4331 Processor operates in either S/370 mode or in Extended Control Program Support: VSE mode. The system mode is selectable at Initial Program Load (IPL) time and determines the base operating characteristics of the machine: S/370 mode allows operation of certain releases of OS/VS1, VM/370, DOS/VSE, DOS/VS and DOS. (See "Programming Note" below for details.) ECPS: VSE mode supports operation of DOS/VSE and SSX/VSE, offering enhanced systems performance.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3179 Color Display Station (base color)
  - 3180 Model 1 Display Station
  - 3191 model A1X, B1X, D1X, D3X
  - (Except LAD > 3191 model A3X, B3X <)
  - 3192 Model C1X, C3X, D1X, D3X, F1X, F3X
  - 3262 Line Printer model 1 (650 lpm system printer)
  - 3262 Line Printer model 11 (325 lpm system printer)
  - 3268 Printer model 2, 2C (340 cps)(1)
  - 3289 Line Printer model 4 (400 lpm system printer)
  - 3278 Display Station model 2, and keyboards
  - (Canada only > 3270 Personal Computer - Control unit terminal mode only(2) <)
  - 3279 Color Display Station model 2A or 02X and keyboards

- 3278 Display Console model 2A, keyboard and control panel
- 3279 Color Display Console model 2C, keyboard and control panel
- 3287 Printer models 1, 2, 1C and 2C
- 4224 Printer models 2XX (200/400 cps) (Non-IPDS Mode)
- 4234 model 1 Dot Band Printer
- 4250 Printer
- Personal Computer XT/370 (5160 model 589) (Control Unit Terminal Mode only) \*\*
- Personal Computer AT/370 (5170 model 599 and 739) (Control Unit Terminal Mode only) \*\*
- 5150 attached to 3278/3279
- 5150/5160/5170 PC with 3278/3279 Emulation Adapter
- 5160 with XT/370 Option Kit and 3278/79 Emulator Adapter (Control Unit Terminal Mode only) \*\*
- 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*\*
- 5210 printer models G01, G02
- 6580 Displaywriter System, Model A04, A06, A08, A10 (25-line display)

Specify #9841 on 4331 must be ordered for attachment of 3268 to the 4331 Model Group 1. Provides microcode and/or maintenance documentation if machine is below EC 366585 (microcode for 4331 Model Group 1) or below EC 366586 (microcode for 4331 Model Group 2, 11) and/or below EC 366584 (maintenance document) for all models.

- (Canada only > Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer and Personal Computer XT/370 and AT/370. <)
- The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (#8332) and specify #9842 in 4331 must be ordered for attachment of Displaywriter.
- The System Diskette Facility is the microcode loading system for the 4331 Processor. The diskette facility reads and writes from removable magnetic diskettes that provide all of the microcode for the 4331 Processor. The diskettes shipped with the 4331 Processor will supply the required microcode for diagnostics, standard functions, and the special features ordered. The System Diskette Facility also allows storage of failure data from 4331 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.
- Reloadable Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode in support of standard functions and special features of the 4331 Processor. The Reloadable Control Storage is not available to the user. Tables 1 and 2 list the Reloadable Control Storage requirements for system microcode.

4331 Model Group 1 includes 65,536 bytes of Reloadable Control Storage. An additional 65,536 bytes is available as an optional feature.

4331 Model Group 2 includes 131,072 bytes of Reloadable Control Storage.

In addition to Reloadable Control Storage, 4331 Model Group 2 contains 12,288 bytes of Read-Only Control Storage.

- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center specialists to remotely monitor and/or perform problem diagnosis on the 4331 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization), remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a 3275 (real or emulated) terminal at a host location.

- One level addressing facility for improved virtual storage control by DOS/VSE and SSX/VSE (ECPS:VSE mode).
- Channels with virtual storage addressing (ECPS:VSE mode).
- Channel Indirect Data Addressing (in S/370 mode).
- Data Streaming Mode can operate on the High-Speed Block Multiplexer channel (not available on Model Group 1). The 3380 is not supported on the 4331.
- S/370 Universal Instruction Set.
- Extended Precision Floating Point.
- Conditional Swapping.
- CE maintenance support functions.
- Storage Protection (Store and Fetch).
- Byte Oriented Operands.
- Clock Comparator and CPU timer.
- Time-of-Day Clock.
- Interval Timer.
- PSW Key Handling.
- Control Registers.
- Machine Check Handling.
- Program Event Recording.
- Monitoring.
- Clear I/O.
- Move inverse instruction (not used by IBM programs).
- 8,192 bytes of high-speed buffer storage (4331 Model Group 2 only).

**Programming Note:** The ECPS:VSE mode may be invoked at IPL time and supports operation of an appropriately generated DOS/VSE Control Program with VSE/Advanced Functions Release 1 and 2, or the Small Systems Executive/VSE.

In S/370 mode, operation of DOS/VSE with VSE/Advanced Functions Release 1 and 2 (generated for use in S/370 mode), VM/370 Release 6 with or without VM/System Product or VM/BSE Release 2 or VM/SE Release 2, and OS/VS1 Release 7 with or without VS1/BPE are supported. Although not supported, DOS Release 26 and DOS/VS Release 34 will operate on the 4331 Processor when in S/370 mode.

**Console Function:** An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer — a 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C is required for this purpose — the display and keyboard function as an operator's I/O console to communicate with the operating system — the Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4331 Processor hardware system, and one displays messages unique to the 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C. The console address is selected at system installation time from the range 009 through 01F.

The console functions in one of two modes: "Display Mode" or the "Printer-KeyBoard Mode". In the "Printer-KeyBoard Mode", the Display Console uses the keyboard for input and the display and a 3287 Printer Model 1 or 2, and 3268 Printer Model 2 for output. The CRT, keyboard and printer appear to the system as a 1052 Printer/Keyboard and operate compatibly with S/360 console operations or as a 3210/3215 Console Printer-KeyBoard and operate compatibly with S/370 Console operations. The operation of the 3287 /3268 printer in this mode is optional, but recommended.

(Japan only > Printer keyboard mode is not available together with the Katakana language option for the operator console or for 3178, 3179 Color Display, 3180 Model 1, 3278 Display, 3268 or 3287 Printer attached to the Display/Printer Adapter. <)

In "Display Mode" the keyboard is used for input and the CRT with 20 lines by 80 characters/line is used for output. The 3287 Models 1, 2, 1C or 2C, and 3268 Model 2 or 2C if attached, has its own address and must be supported by either the 3277 Console Support of DOS/VS Release 34, the 3277 Console Support of DOS/VSE and SSX/VSE, the Multiple Console Support of OS/VS1, the local-attached 3286/3287 /3268 Printer support of VM/370, or the equivalent of any of these.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

**Byte Multiplexer Channel (Optional):** Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and "Table 3" below for details. The channel permits simultaneous operations of low speed devices. Operates at up to 18K bytes per second (Model Group 1) or at up to 36K bytes per second Model (Group 2) in single byte mode. Up to 500K bytes per second in burst mode. See "IBM 4331 Channel Characteristics", GA33-1527 for 4331 Model Group 1 or GA33-1535 for 4331 Model Group 2, for devices which may attach and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0.

**Subchannels:** The 4331 Model Group 1 Byte Multiplexer Channel (#5248) provides up to 31 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of subchannels is reduced from 31 with the addition of certain special features:

Feature	Subchannels Unavailable
DASD Adapter (#3201)	2
8809 Magnetic Tape Unit Adapter (#4910)	2
Block Multiplexer Channel (#1421)	1
Communications Adapter (#1601)	1
Each telecommunication line on the Communications Adapter (#1601)	1

The 4331 Model Group 2 byte Multiplexer Channel (#5248) provides up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 36 subchannels is reduced by one if the Communications Adapter (#1601) is installed, and one for each telecommunication line on the Communications Adapter.

**Block Multiplexer Channel (Optional):** Each provides eight control unit positions. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and "Table 3" below for details. The Block Multiplexer Channel permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" and facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. 33XX devices (and the 3830 or 3880 storage control units) do not attach.

- 4331 Model Group 1: One channel is optional. Data rate is up to 0.5 million bytes per second -- see IBM 4331 Model Group 1 Channel Characteristics, GA33-1527, for details. Standard channel address is 1, a different address may be selected at installation time from the range of 1 to 6.
- 4331 Model Group 2: Two channels are optional. Data rate is up to 1.25 million bytes per second -- see "IBM 4331 Model

Group 2 Channel Characteristics", GA33-1535, for details. If installed together with High-Speed Block Multiplexer Channel, the data rate of the Block Multiplexer Channel, Add'l (#1422) is up to 0.6 million bytes per second. Channel addresses may be selected at installation time from the range of 1 to 6.

**Subchannels:** The following subchannel combinations can be configured at installation time:

- up to 128 non-shared subchannels and
- up to 16 shared subchannels, each with devices in multiples of 8, up to a total of 128 devices

**High-Speed Block Multiplexer Channel (Optional):** One channel is optional on 4331 Model Group 2 only. High data rate (up to 1.86Mb/sec) allows attachment of high-speed I/O devices including 2311/2314/2319, 3330/3333/3340/3344, 3350, 3370 via control units. Ability to "Block Multiplex" and facility for Multiple Requesting allows several I/O units to operate concurrently with greater channel efficiency. Can operate in Data Streaming Mode, which allows increased interface cable length and allows attachment of a control unit, e.g., a 3880, operating in Data Streaming Mode. The 3380 is not supported on the 4331. Devices attached which cannot utilize block multiplexing will function as if attached to a Selector Channel. Eight control unit positions are available. When certain control units/devices are to be connected, the optional Power Interface (#5531, #5532) for power control must be installed on the processor. See "Special Features" and Table 3 for details. The channel address is selected at installation time from the range of 1 to 6.

**Subchannels:** Same as the Block Multiplexer Channel.

**Native I/O Adapters:** The following I/O adapters control the designated I/O devices:

DASD Adapter  
5424 Adapter  
Loop Adapter  
8809 Magnetic Tape Unit Adapter  
Display/Printer Adapter  
Communications Adapter

**Note:** All data passing through the system for any I/O device interfaces with the data flow for other devices, producing I/O limitations. The limitations take two forms:

- Hardware exclusives listed in the sales manual.
- I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:

- The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
- The number and speed of lines attached to the Communications Adapter.
- The number and class of overrunable devices on the Byte Multiplexer Channel.
- The number and traffic on 3178, 3179, 3180 Model 1, 3278 Model 2 or 3279 Model 2A or 02X or 5150/5160 PC with 3278/3279 Emulation Adapter attached to the Display/Printer Adapter.

It is necessary to consult the "IBM 4331 Channel Characteristics Manual", GA33-1527, for 4331 Model Group 1 or GA33-1535, for 4331 Model Group 2 to properly configure a 4331 with an I/O configuration that has not previously been analyzed.

**DASD Adapter (Optional):** One DASD Adapter is optional on the 4331 Model Group 1, one or two are available on the 4331 Model Group 2. Attaches 3310, 3370 A1/A2 and/or 3340/3344 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 normally operate in fixed block mode where optimum DASD and system performance is achieved. If 3370 Model 2 attaches to the DASD Adapter, DASD Count-Key-Data (CKD) emulation is not provided.

As a transition aid and to allow the use of operating systems and programs which require Count-Key-Data (CKD) direct access storage, the 3340/3344 Direct Attachment and Direct Access Storage (DAS) Compatibility for emulation of 231X on 3310 or 3370 and 3330/3340 on 3370 are available. Operation with DAS Compatibility or the 3340/3344 Direct Attachment features in general will not achieve the same performance as the equivalent devices when attached to S/370 or 4300 processor channels. See performance notes included with the feature descriptions.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	01	02	03	04	05	06	07
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F

and

X10	11	12	13	14	15	16	17
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

With a direct-attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a S/3 Model 12 or 15; this is a read-only mode and is available as a conversion aid for users converting to the 4331 Processors from a System/3.

The Direct Access Storage Compatibility feature provides emulation of 231X, 3330 (100Mb/volume) or 3340 data formats on the 3370 Model A1 and B1 Direct Access Storage and the emulation of 231X data formats on the 3310 Direct Access Storage. For address assignment of emulated volumes refer to "IBM 4331 Processor Compatibility Features", GA33-1528.

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

**Display/Printer Adapter (Standard):** This adapter allows for attachment of the prerequisite 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C and up to seven (or 15 with optional feature, see below) additional devices chosen from the list below:

- 3178 Display Station
- 3179 Color Display Station (base color)
- 3180 Model 1 Display Station(2)
- 3191 Model A1X, B1X, D1X
- 3262 Line Printer Model 1 and 11 (650 and 325 lpm)
- 3268 Printer Model 2 and 2C (340 cps)(1)
- 3278 Display Station Model 2
- (Canada only > 3270 Personal Computer - Control unit terminal mode only(3) <)
- 3279 Color Display Station Model 2A or 02X
- 3287 Printer Models 1, 2, 1C and 2C (80 and 120 cps)
- 3289 Printer Model 4 (400 lpm)
- 4224 Printer Models 2XX (200/400 cps) (Non-IPDS Mode)
- 4234 Model 1 Dot Band Printer (300 lpm)
- 4250 Printer
- Personal Computer XT/370 (5160 Model 589) (Control Unit Terminal Mode only) \*\*\*
- Personal Computer AT/370 (5170 Model 599 and 739) (Control Unit Terminal Mode only) \*\*\*
- 5150 attached to 3278/3279
- 5150/5160/5170 PC with 3278/3279 Emulation Adapter
- 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*\*\*

- 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*\*\*
- 5210 printer Models G01, G02
- 6580 Displaywriter System, Model A04, A06, A08, A10 (25-line display)

Notes:

1. Specify #9841 in 4331 must be ordered for attachment of 3268 to the 4331 Model Group 1. Provides microcode and/or the maintenance documentation if machine is below EC 366585 (microcode for 4331 Model Group 1) or below EC 366586 (microcode for 4331 Model Group 2, 11) and/or below EC 366584 (maintenance document) for all Models.
2. The 3180-1 is supported only when it is emulating a 3278 Model 2. The 3180 extended functions or larger screen formats are not supported.
3. Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer and Personal Computers AT/370 and XT/370.

These machines may be installed in any combination, provided that (1) only seven (or 15 with optional feature) devices are installed and (2) no more than two system printers (3262 and/or 3289) are included. Due to the processing power of the 4250, it is not practical to attach more than two on Model 1 or more than four on Model 2, see "Specify". The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The file transfer function from Personal Computer to host and the screen capture function to the PC printer or diskette are not supported on the Personal Computer attached to the 3278/3279 if connected to the Display Printer Adapter.

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287 /3268/4224/4234 Printer may be used as a console hardcopy device; one or more 3287 /3268/4234 printers may be used as hardcopy workstation devices; one or more 5210s may be used as high quality printers in 3287 mode only. The 3178, 3179 Color Display Station (base color), 3180 Model 1, 3278 Display Station Model 2, (Canada only > 3270 Personal Computer - Control Unit Terminal Mode only\*\*, <) or 3279 Color Display Station Model 2A or 02X may be used as additional operator's consoles with the presence of OS/VS1 Multiple Console Support or equivalent, or as workstations for user-written applications. The 6580 Displaywriter System emulates a 3278-2 Display Station, and, optionally, a 3287-1/2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278-2 and 3287-1/2. Display/Printer Adapter support includes all standard functions of the 3274 Model X1B with the 3178, 3179, 3180 Model 1, 3278 Model 2, (Canada only > 3270 Personal Computer - Control Unit Terminal Mode only\*\*, <) or 3279 Model 2A or 02X or 5150/5160 PC with 3278/3279 Emulation Adapter attached. In addition, the following 3180 Model 1, 3278 Model 2 or 3279 Model 2A or 02X special features are supported: Keyboard Numeric Lock (standard on the 3178, 3179, or 3180 Model 1), Audible Alarm (standard on the 3178, 3179, 3180 Model 1 or 3279), Security Keylock (standard on the 3180 Model 1), and Switched Control Unit (Switch Control Unit as an accessory on 3179 and 3180 Model 1). Other 3180 Model 1, 3278 Model 2 or 3279 Model 2A or 02X special features are not supported. When used as workstations, 3180 Model 1 display station keyboard, feature codes #4600 or #4601 may be selected; or on the 3278 or 3279 Display Station keyboard feature codes #2715, #2716, #2717, #4621, #4622, #4623, #4627 may be selected. If two different keyboards are required for a workstation, one must be (Japan only > #2715 or <) #4621. Addresses for these devices are selected at installation time from the range 009 through 01F.

\*\* Specify #9843 on 4331 must be ordered for attachment of the 3270 Personal Computer or Personal Computers XT/370 and AT/370.

Only two language/keyboard combinations may be installed on the Display/Printer Adapter or the Display/Printer Adapter Expansion (#2001). Language(s) supported and keyboard(s) to be attached must be specified at order entry-time or via MES, see "Specify" below. (Japan only > If a Katakana operator console is installed, the 3278 Model 2 or 3279 Model 02X Display Stations with Katakana installed on the Display/Printer Adapter must have typewriter keyboard #2715 or #2717. <)

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (#8332) and specify #9842 in 4331 must be ordered for attachment of Displaywriter.

Specify #9843 must be ordered for attachment of the 5150/5160 PC with 3278/3279 Emulation Adapter.

**Display/Printer Adapter Expansion (Optional):** Expands the capability of the standard Display/Printer Adapter to permit the 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C and up to 15 displays and/or printers to directly attach to the 4331 Processor. All other capabilities and limitations are listed under Display/Printer Adapter (Standard) above.

**Diskette Drive (Optional):** A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4331 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below) or a data capacity of 246,272 bytes organized in 1,924 sectors of 128 bytes each (for use in exchanging data with another 4331 Processor). Each Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with DOS/VSE or DOS/VS POWER refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and Series/1 and Systems/3, 32, 34, and 38. One diskette is shipped with the feature. Device address is selected at installation time from the range 009 through 01F.

**5424 Adapter (Optional):** Provides native attachment of 5424 Multi-Function Card Unit Models A1 or A2 (Models K1, K2, K3 are available in Japan only) for 96-column card operations -- Device address is 04C.

**Loop Adapter (Optional):** The Loop Adapter on the 4331 Model Groups 1 and 2 is a native attachment method for the 3640 Plant Data Communications Terminals -- 3104 Display Terminal Models B1, B2 -- 8775 Display Terminal Models 1 and 2 -- 3232 Keyboard Printer -- 3287 Printer -- 3274 Control Unit Model 51C, 61C, 52C -- 3276 Control Unit Display Station with their associated terminals -- 7426 Terminal Interface Unit Model 1 with its associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexibility.

A maximum of two direct-attached loops and two data link adapters are supported. Each of the direct-attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore, lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one 3843 Loop Control Unit as point-to-point or up to 4 Loop Control Units as multipoint configuration. Details on programming information are provided in the "IBM 4331 Loop Adapter Programming Guide", SC31-0500-0.

User-written programs for loop-attached terminals reside in the 4331 Processor storage and are controlled by VSE and ACF/VTAME or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition, IBM offers a PRPQ to CICS/VS (announced December 23, 1980). This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4331 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

- Terminal initialization
- Terminal re-initialization
- 3642 encode check handling

## ● Transaction selection

Communications network management problem determination support for 4331 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer Model 11, 3276 Display Control Stations and 3274 Model 51C, 61C, 52C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal Models 1, 2 -- 3642 Encoder Printer Models 1, 2 -- 3643 Keyboard Display Model 2, 3, 4 including 4920 Badge and Document Encoder -- 3644 Automatic Data Unit -- 3645 Printer -- 3646 Scanner Control Unit -- 3647 Time and Attendance Terminal -- 3104 Display Terminal Models B1, B2 -- 8775 Display Terminal Models 1,2 -- 3232 Keyboard Printer Model 11 -- 3287 Printer Models 11, 12 -- 3274 Control Unit Model 51C, 61C, 52C -- 3276 Control Unit Display Station Models 11-14 with their associated terminals -- 3843 Loop Control Unit -- 7426 Terminal Interface Unit Model 1 with its associated terminals. Device addresses are 040 through 07E.

**8809 Magnetic Tape Unit Adapter (Optional):** Provides native attachment of 8809 Model 1A and up to five additional 8809 tape units (consisting of a mix of 8809 Model 2s and 3s) -- allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for loading or off-loading DASD devices or in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read Backward commands are not supported, the Read Backward operation is simulated in the Logical IOCS (MTMOD) of DOS/VSE. Standard channel address is 3. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

**Communications Adapter (Optional):** The 4331 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocall unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit-terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For further details, refer to "Special Features".

## IBM Stand-Alone Modems

Modems	Speed (bps)	Lines
3833-1	2400	Nonsw voice grade
3834-1	4800	Nonsw voice grade
3863-1,2	2400/1200	Nonsw
3864-1,2	4800/2400	Nonsw
3865-1,2	9600/4800	Nonsw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3868-3,4	9600/4800	Nonsw voice grade
3872-1	2400/1200	Nonsw
3874	4800/2400	Nonsw
3875	3600/7200	Nonsw
5811-10	2400 to 19200	Limited distance modem
5811-18		Rack mount ver- sion of Model 10
5811-20	2400 to 19200	Nonsw baseband
5811-28		Rack mount ver-

5812-10	2400 to 19200	sion of Model 20
5812-18		Nonsw baseband Rack mount ver- sion of Model 10
5865-2,3	9600/7200/ 4800	Nonsw voice grade Rack mount ver- sion of 5865-2
5868-52		Nonsw voice grade Rack mount ver- sion of 5866-2
5866-2,3	14400/9600	
5868-62		

(Canada only>The following modems are supported with the Switched Network Back-up feature -- see M3863, 3864, 3865, 3872, 5865 and 5866 pages for details:

Modems	Speed (bps)	Lines
3863-1,2	2400/1200	Nonsw voice grade
3864-1,2	4800/2400	Nonsw voice grade
3865-1,2	9600/4800	Nonsw voice grade
3872-1	2400/1200	Nonsw voice grade
5865-2,3	9600/7200/ 4800	Nonsw voice grade
5866-2,3	14400/9600	Nonsw voice grade

Note: 2- and 4-wire SNBU are supported by 5865 and 5866 modems.<)

**IBM Integrated Modem (V.23, 1200 bps):** The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire
- (Canada only>Nonswitched line with switched network backup and auto answer
- Nonswitched line with switched network backup with manual answer<)

**OEM Modems:** OEM modems that comply with EIA RS-232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

**PTT-Mandatory Modems:** The Communications Adapter will support the mandatory modems which the PTTs in various WT countries provide for attaching Data Terminal Equipment (DTE), such as the Communications Adapter, to their facilities. See M2700 pages

**X.21 Adapter for Nonswitched Networks:** The X.21 interface allows attachment to the X.21 facilities available in certain countries by way of an internal X.21 adapter.

**Automatic Calling Equipment:** The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- The Communications Adapter will support mandatory autocal Units which the PTTs in various WT countries provide in accordance with CCITT V.25. See Autocall Unit Interface (#1020) for specifics.
- Other Automatic Calling Equipment which complies with EIA RS-366 or CCITT V.25 may be connected to the Autocall Unit Interface (#1020) under the provisions of the IBM Multiple Supplier Systems Bulletin.

## SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Power (1-phase, 3-wire, 60 Hz): #9902 for 208V, #9914 for 240V, #2732 for 200V, 2803 for 220V.

(1-phase, 3-wire, 50 Hz): #2813 for 220V, #2801 for 240V, #2806 for 200V, #2821 for 230V. (Meets Japanese Current Leakage Requirements.)

- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.
- Machine Nomenclature: National safety regulations require maintenance labels in local language. The language is determined by default from the 3-digit country code in the machine order. If the installation country is different from the order country specify #2900 which provides sets of labels in other languages. The IBM CE selects and installs the appropriate one. (Canada only>In Quebec: Specify #2935 for Canadian French #2934 for English.<)
- Specify #9260 for 4250 attachment and #9841 for 3268 or 4234 Model 1 attachment.
- Specify #9843 must be ordered for attachment of 5150/5160 PC with 3278/3279 Emulation Adapter and Personal Computer XT/370 and AT/370.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4331 Processor. It provides service personnel the capability of remotely controlling the 4331 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on ordering and customer responsibilities, see "Systems and Procedure Manual".

(Australia and Brazil only>When specified, each 4331 Processor will be equipped with either a CCITT interface or 1200 bps Integrated Modem (switched network, manual answering) for RSF.

1. Specify #2838 for CCITT interface.
2. Specify #2836 for 1200 bps Integrated Modem, switched network, manual answer.<)

(Canada only>Specify #9510 for Remote Support Facility via a 1200 bps integrated modem, switched network, manual answer.<)

(Japan only>Each 4331 Processor will be equipped with either a CCITT interface or 1200 bps Integrated Modem, non-switched.

1. Specify #2838 for acoustic coupler interface.
2. Specify 2944 for 1200 bps Integrated Modem, non-switched. Also specify #2943 for the NTTCA-2 modem service cable connector.<)

(All other countries>Consult your country's DPCE department.<)

- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real\* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4331 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4331 are suppressed when ROCF is in use.

\* 3275 Model 2 can only be obtained on an as available basis.

(Except Canada, Hong Kong>Specify ROCF feature #2838 for CCITT V.23/V.24/V.28 Interface. The requisite customer-supplied or PTT-mandatory non-clocked external modem attached to feature #2838 must include auto answer. Line discipline is BSC, 600 or 1200 bps.

Notes: Katakana is not supported for 3275 Model 2 as the remote console. Katakana is supported only by the VM/Pass-Through Facility Program Product.<) (Canada only> Specify ROCF feature #9511 for EIA-Interface. The requisite customer-supplied non-clocked WE 202S equivalent external modem attached to feature #9511 must include auto answer. Line discipline is BSC, 600 or 1200 bps.<) (Hong Kong only> Specify #2838 for CCITT V.23/V.24/V.28 Interface and #2839. The requisite customer-supplied or PTT-mandatory non-clocked external modem must include auto answer. Line discipline is BSC, 600 or 1200 bps.<)

- Loop-Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274-51C, 52C, 61C and/or 3276 Control Units are attached to the system via Loop Adapter 1 and/or 2 (#4830, #4831) and/or Data Link Adapters (#4840).

- #9251 3641 Reporting Terminal/3647 Time and Attendance Terminal
- #9252 3642 Encoder Printer
- #9253 3643 Keyboard Display
- #9254 3644 Automatic Data Unit (ADU)
- #9256 3646 Scanner Control Unit
- #9257 8775 Display Terminal 3287/3645 Printer 3274-51C, 52C, 61C and 3276 Control Unit and 3104 Display Terminal
- #9258 3643 Keyboard Display with #4920

- Keyboard/Character Set Language: Must be specified on the 4331 for 3178, 3179, 3180, 3191 Model A1X, B1X, 3192 Model C3X, D3X, F3X, 3278, 3279, 3287, 4234 devices attached to the Display/Printer Adapter and for 3641, 3642, 3643 devices attached to the Loop/Data Link Adapter. It must correspond to the Keyboard/Character Set Language ordered for the device.

- Specify language from Table 5 Column A. This language is mandatory for the 3278 Model 2A or the 3279 Model 2C and can be used for 3178 Model C2, 3179, 3180 Model 1, 3278 Model 2, 3191 Model A1X, B1X or 3279 Model 02X with typewriter keyboards and 3287 printers.
- For attachment of 3178 Model 1C, 3180 Model 1, 3278 Model 2 with Data Entry Keyboards, select one language from Table 5 Column B and specify one of the mutually exclusive keyboard types. #9301 for Data Entry, 3180 Model 1 with #4601, 3178 Model 1C with #4622, #2716, or #9302 for Data Entry, keypunch-layout (#4623).

**Note:** 3178 Model C1K cannot be used and Data Entry Keyboard cannot be specified for 3180 Model 1, 3278 Model 2 or 3279 Model 02X display workstations if Katakana is to be used on both the operator console and the workstations.

- If alternate language for 3178 Model 2C, 3179, 3180 Model 1, 3278 Model 2 or 3279 Model 02X with typewriter keyboard is required, specify language from Table 5 Column B and keyboard type as follows: #9303 for typewriter keyboard 3178 Model 2C #2715, #2717, #4621, #4627.

**Note:** 3178 Model C1, 3180 Model 1, 3278 Model 2 or 3279 Model 02X with Data Entry Keyboard cannot be attached in this case.

- For 3641/3642/3643 devices US English #2956 is automatically supplied. In addition, one alternate language can be selected from Table 5, column B. It must correspond to the alternate language which may have been specified for 3178/3179/3180/3278/3279/3287 devices. As an exception, #2930 US Keyboard/Katakana Display, not available for 3178/3179/3180/3278/3279, may be specified for 3643 in addition to the alternate language for 3178/3179/3180/3278/3279/3287.

Table 5 - Keyboard Language/Character Set Language

A	B
Mandatory	Alt Lang

and/or  
K/B Type

International	#0950	#2950
US	#0956	#2956 (1)
EBCDIC	#0951	#2951
Brazil	#0975	#2975
Spain	--	#2960 (5)
Span Speaking	#0969	#2969 (2)
Japanese Eng	#0955	#2955
Katakana	#0973 (3)	#2973
US Keyboard,	--	#2930 (6)
Katakana Display		
Canadian French	#0956 (4)	#2977

#### Notes:

- Automatically supplied for 3641/3642/3643 devices.
- Not available for 3642. Spain #2960 will be supplied.
- (Japan only> For Katakana specify #0973 on 4331, and #2720 and #2773 on the 3278 Model 2A or the 3279 Model 2C.<)
- For Canadian French, specify on the 4331 US #0956. For the 3278 Model 2A or 3279 Model 2C, Canadian French Keyboard Language (#2977) must be specified.
- Not available for 3278/3279/3287 and 3641/3643 devices. This character set is used for 3642 when Spanish Speaking is specified.
- Only available for 3643.

(Canada only> Specify #9843 on 4331 must be ordered for attachment of the 3270 Personal Computer and Personal Computer XT/370 and AT/370.<)

- For 3641/3642/3643 devices US English #2956 is automatically supplied.
- Console Table: A console table is available -- see #1550 or "Accessories" section for details. Book Rack and Cable Holder -- see #1480 or "Accessories" section.
- See 3278 Display Console Model 2A or 3279 Color Display Console Model 2C for console cabling.

#9842 - For attachment of 6580 Displaywriter System to the Display/Printer Adapter (ordered on the 4331 only, not on the Displaywriter).

#### SPECIAL FEATURES

##### Legend:

%x: Feature supplies diskette for System Diskette facility.

%z: System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette.

**Adapter Power Prerequisite (#1001):** Provides power and control circuitry necessary for the Communications Adapter (#1601) (when more than three line features are attached), and the Adapter Logic. Maximum: One. Field Installation: Yes. Prerequisites: #1002, or for the Loop Adapter (#4830) and/or #1601 with more than three line attachments #4695 and/or #4696.

**Adapter Logic Prerequisite (#1002):** Provides logic and control function necessary for the 5424 Adapter (#3901). Maximum: One. Field Installation: Yes. Prerequisites: #1001.

**Block Multiplexer Channel (#1421), Add'l (Model Group 2) (#1422):** Each provides means of attaching I/O devices. Up to eight control units may attach to each channel. Disconnect during command chaining allows multiple I/O devices to operate concurrently. The 3830 and 3880 Control Units with associated DASD do not attach.

See DASD Adapter (#3201, #3202) for attachment of 3340/3344/3310/3370 devices.

4331 Model Group 1: Data transfer rates up to 0.5 million bytes per second.

4331 Model Group 2: Data transfer rates up to 1.25 million bytes per second each.

If High-Speed Block Multiplexer Channel is installed, the data rate is up to 0.6 million bytes per second for the Block Multiplexer Channel, Add'l (#1422). See "Input/Output Attachment" section above for details on subchannels. Limitations: (1) 231X can only be installed on Block Multiplexer Channel #1421, not on #1422. (2) 231X devices cannot operate with any telecommunication line feature on the Communications Adapter which operates at a speed greater than 9600 bps (#4720). On 4331 Model Group 1 only: (3) Block Multiplexer Channel, Add'l (#1422) is not available. (4) 231X devices may not be installed with any of the following: 3370s on the DASD Adapter (#3201, #3202), 3340/3344 Direct Attachment (#7851), 8809 Magnetic Tape Unit Adapter (#4910), Magnetic Tape Units attached to the Byte Multiplexer Channel (#5248). On 4331 Model Group 2: (5) Block Multiplexer Channel, Add'l (#1422) not be installed with 8809 Magnetic Tape Unit Adapter (#4910). (6) 231X devices cannot be installed on the Block Multiplexer Channel (#1421) if High-Speed Block Multiplexer Channel (#1431) is installed. Maximum: #1421 one, #1422 one (Model Group 2). Field Installation: Yes. Prerequisites: #1422 requires #1421. For certain control units/devices the processor requires Power Interface feature (#5531, #5532). See Table 3.

**High-Speed Block Multiplexer Channel (#1431):** (Model Group 2) Provides attachment of high-speed I/O devices including 3330/3333, 3340/3344, 3350, 3370 A1 via control units including 3830 Model 2 and 3880. The control unit can operate in Data Stream Mode. Up to eight control units may attach. Data transfer rate up to 1.86 million bytes per second. (See "Input/Output Attachment" section above for specifics). Limitations: (1) Not available on 4331 Model Group 1. (2) For data rate and attachment limitations for other devices and communications lines refer to "IBM 4331 Processor Channel Characteristics", GA33-1535 (Model Group 2), which contains tables of pre-analyzed configurations. (3) Cannot be installed with 8809 Magnetic Tape Unit Adapter (#4910). (4) 231X devices must be attached to the High-Speed Block Multiplexer Channel and cannot be used on the Block Multiplexer Channel (#1421). (5) Is mutually exclusive with DASD Adapter, Add'l (#3202). Maximum: One. Field Installation: Yes. Prerequisites: For certain control units/devices, the processor requires Power Interface feature (#5531, #5532). See Table 3.

**Control Storage Expansion (#1901):** (Model Group 1) Increases the Control Storage capacity of the Model Group 1 from 65,536 to 131,072 bytes, providing additional storage area for special features and the basic functions of the 4331 Processor. See Tables 1 and 2 to determine the requirement for this feature. Limitations: Not available on 4331 Model Group 2 (expanded control storage is standard). If installed on Model Group 1, this feature should be deleted with the order entry for conversion to Model Group 2. Maximum: One. Field Installation: Yes. Note: This is for order entry only. The feature is not physically removed when upgrading to a Model Group 2.

**Microcode Storage Requirements:** The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, and to determine when Control Storage Expansion (#1901) is required, use the following procedure. Note: An interactive HONE aid is available dependent on the control program or program product device support to facilitate this procedure.

- Consulting Table 1, determine the microcode groups required to support the features and I/O to be installed.

- On Table 2, place a check mark in the appropriate rows. Note that each microcode group is required only once, even if it supports multiple functions of the 4331 Processor. The only exception to this is microcode group 2 where 2,048 bytes of Processor Storage are required per megabyte of virtual storage defined in the notes.
- Find the sum of each of the three columns for the required microcode groups.
- The total from Column A and B must pass three tests.
  - When the total from Column A exceeds 65,536 bytes, Control Storage Expansion (#1901) is required (4331 Model Group 1).
  - When the total from Column A exceeds 131,072 bytes for a Model Group 1 or 143,360 bytes for a Model Group 2, an invalid configuration has been selected (see Note below).
  - When the total from Column A plus the total from Column B exceeds 262,144 bytes, an invalid configuration has been selected (see Note).
- Subtract the total from Column A from either:
  - 131,072 if #1901 is required (4331 Model Group 1), or
  - 65,536 if #1901 is not required (4331 Model Group 1).
  - 143,360 if 4331 Model Group 2 is being configured.
- Subtract the results of Step 5 from the total of Column B.
- Add the results of Step 6 to the total from Column C and round up to the next multiple of 4,096.

The results of Step 7 determine the amount of Processor Storage occupied by microcode and should be subtracted from the Processor Storage size ordered to determine the amount available for the user. The storage for Group 9 (DAS Compatibility #7901) is only occupied if the feature is activated at IPL time.

**Note:** Too many features/options have been selected. Inspect Table 1 and 2 and determine which feature(s) of lower priority should be deleted from the configuration.

Table 1 - Microcode Groups

Function/Feature Installed	Micro-code Group
4331 Processor	1
Processor Storage	2
3310 attached (#3201 and #9202)	3,4,5,6
3370 attached (#3201 and #9201)	3,4,6,17
3340/3344 Direct Attach (#3201 and #7851)	3,6,8,15
Direct Access Storage Compatibility (#7901)	9,15
8809 Magnetic Tape Unit attached (#4910)	3,4,6,7
Communications Adapter Base (#1601)	6,10
BSC lines installed (#9671-#9678)	11
S/S lines installed	

(#9681-#9688)	12
SDLC lines installed (#9691-#9698)	13
ECPS: VM/370 (#8701)	16
1401/1440/1460 Compatibility (#3950)	14
High-Speed (BMPX) Channel (#1431)	21

14	14336	-	1800	Excl. w/ Grp. 7 and 16
15	-	5760	200	
16	6656	-	-	Excl. w/ Grp 14
17	-	9316	10000	
21	8448	2880	400	Mdl Grp 2 only
TOT- AL				

Table 2 - Storage Per Microcode Group

Mic- ro- code Grp	A Cntrl Stor. only	B Cntrl Stor. or- Proc. Stor.	C Proc. Stor. only	Notes
1	33792	66816	24576	
2	-	-	2048	For each 1Mb of processor stor- age in S/370 mode or for each 1Mb of virtual storage in ECPS: VSE mode, in steps of 2,4,8,16Mb.  For Model Grp 2 when High-Speed BMPX or ECPS: VM/370 is installed.  or 32768
3	6144	24320	7168	
4	5120	12288	-	
	-	4608	11250	
6	-	-	10250	
7	6144	9728	3060	Excl. w/Grp 14
8	9216	13312	11600 8800 1800	Plus Per 3340 buffer. For a 2nd string of 3340s attached to DASD adaptr.
9	-	27648	1300 4096 7680 13312 8704	Plus Per 2311 buffer Per 2314 buffer Per 3330 buffer Per 3340 buffer
10	8192	9216	2150	
11	6144	-	-	
12	5120	-	-	
13	12288	-	1024	

**Display/Printer Adapter Expansion (#2001):** Expands the capability of the standard Display/Printer Adapter to allow the 3278 Model 2A or the 3279 Model 2C and up to 15 displays and/or printers to directly attach to the 4331 Processor. The devices attachable are:

- Up to 15 3178 Display Stations
- Up to 15 3179 Color Display Stations
- Up to 15 3191 Model A1X, B1X, D1X, D3X Display Stations
- Up to 15 3192 Model C1X, C3X, D1X, D3X, F1X, F3X Display Stations
- Up to 15 3180 Model 1 Display Stations  
(Canada only > Up to 15 3270-PCs <)
- Up to 15 3278 Display Station Model 2s
- Up to 15 3279 Color Display Station Model 2A or 02X
- Up to 15 3268 Printers Model 2
- Up to 15 3287 Printer Models 1, 2, 1C and 2C
- Up to 2 3289 Line Printer Model 4s
- Up to 2 3262 Line Printer Model 1s and 11s
- Up to 15 4234 Printer Model 1s
- Up to 2 4250 Printers Model 1 or four Model 2s
- Up to 15 5150/5160/5170 PCs with 3278/3279 Emulation Adapter
- Up to 15 5210 printer Models G01, G02
- 6580 Displaywriter System Model A04, A06, A08, A10 (25-line display). Can connect to 1 or 2 device ports (display station or display station and printer).

Other details are the same as given under the description of the Standard Function: Display/Printer Adapter, above. Limitations: Only the 3278 Model 2A or the 3279 Model 2C and 15 devices (listed above) may attach to the Display/Printer Adapter and the Display/Printer Adapter Expansion. Maximum: One. Cable Order: See "Accessories" for ordering information for the required coaxial cable. Field Installation: Yes. Specify: See "Specify" for language/keyboard combinations available. Prerequisites: The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Workstation licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (#8332) and Specify #9842 in 4331 must be ordered for attachment of Displaywriter.

**DASD Adapter (#3201%x), Add'l (4331 Model Group 2) (#3202%x):** Each allows attachment of the 3310, 3370 A1 (Models A2/B2 for 4331 Model Group 2) and 3340/3344 DASD to the 4331 Processor. Up to four strings of devices may be attached to each adapter. The attachable device types may be intermixed on each adapter but not within a string. The maximum number of strings of each type of device on each DASD Adapter is:

- Up to four 3310 Model A1s or A2s with 3310 Model B units attached, up to a maximum of 4 drives per string.
- Up to four 3370 Model A1s with 3370 Model B1 units attached, up to a maximum of 4 devices (8 actuators) per string. Up to four 3370 Model A1/A2s with 3370 Model B1/B2 units attached, up to a maximum of 4 devices (8 actuators) per string for 4331 Model group 2. Intermix of 3370 Models 1 and 2 on strings and within a string is supported.
- Up to two 3340 Model A2s with 3340/3344 Model B units attached, up to a maximum of eight drives per string - (3340/3344 Direct Attach feature #7851 is required). Attachment of 3340/3344 is limited to two strings on the system.

String Switch Capability allows sharing of 3340 Model A2 and/or 3370 Model A1/A2 and associated drives with another IBM

processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340 Model A2 or 3370 Model A1/A2 must have the String Switch feature #8150 installed. String switch support for 3340/3344 is limited to the static assignment of a shared string to one processor at a time. Limitations: (1) DASD Adapter, Add'l (#3202) is not available for Model Group 1. (2) DASD Adapter, Add'l (#3202) is mutually exclusive with High-Speed Block Multiplexer Channel (#1431). (3) 3310 and 3370 are not supported by VS1 in fixed block mode. (4) For data rate and attachment limitations for other devices and communications lines refer to "IBM 4331 Processor Channel Characteristics", GA33-1527 (Model Group 1) or GA33-1535 (Model Group 2), which contains tables of pre-analyzed configurations. (5) On 4331 Model Group 1 only: 3340 or 3370 may not be attached to the DASD Adapter if 231X DASD is attached to the Block Multiplexer Channel (#1421, or #5655 with #9831). (6) on 4331 Model group 2 only: DASD CKD Emulation (#7901) is not provided if 3370 A2/B2 is installed. Maximum: One #3201 and one #3202 (on 4331 Model Group 2). Field Installation: Yes. Prerequisites: 3340/3344 requires #7851 -- see Table 1 for microcode storage requirements and possible requirement for #1901 on Model Group 1 -- #3202 requires #3201. Specify: #9202%z if 3310 and/or #9201%z if 3370 Model 1 and #9318%Z if a 3370 Model 2 (4331 Model group 2 only) attaches to the DASD Adapter. #9316 if String Switch Capability is required with 3370.

**Diskette Drive (#3401):** A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. Limitations: Not supported by VM/370. Maximum: One. Field Installation: Yes.

**External Signals (#3898):** Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. Maximum: One. Cable Order: Required. Field Installation: Yes. Prerequisites: External Devices must meet the interface specifications outlined in "S/360 Direct Control Feature OEMI", GA22-6845.

**5424 Adapter (#3901%z):** Allows attachment of one 5424 Multi-Function Card Unit Model A1 or A2. (Japan only) Also allows attachment of one 5424 Model K1, K2 and K3. (<) Limitations: The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed with the Loop Adapter (#4830). Maximum: One. Field Installation: Yes. Prerequisites: #1001 and #1002.

**1401/1440/1460 Compatibility (#3950%z):** A feature which, in conjunction with special software, permits execution of 1401/1440/1460 instructions. Feature may be used with S/370 mode or with ECPS/VSE mode. See "Software" for details concerning prerequisites. Limitations: May not be installed with 8809 Magnetic Tape Unit Adapter (#4910). May not be installed with ECPS/VM/370 (#8701) and does not operate under VM/370. Support is available under DOS/VSE/Advanced Function, DOS/VS Release 34 and DOS Release 26. Maximum: One. Field Installation: Yes. Prerequisites: IBM Systems 1401/1440/1460 Emulator Program Product. See Programming pages for details. See Table 1 for microcode storage requirements and possible requirement for #1901.

**8809 Magnetic Tape Unit Adapter (#4910%z):** Provides for attachment of the 8809 Magnetic Tape Unit. One 8809 Model 1A may attach. Up to five 8809 Model 2s and 3s may attach to the Model 1A for a total of six 8809 Magnetic Tape Unit drives. Limitations: (1) May not be installed with 1401/1440/1460 Compatibility (#3950). (2) May not be installed with Block Multiplexer Channel, Add'l (#1422) on 4331 Model Group 2. (3) May not be installed on 4331 Model Group 1 if 231X devices are attached to the Block Multiplexer Channel (#1421). (4) May not be installed with High-Speed Block Multiplexer Channel (#1431) on 4331 Model Group 2. (5) The 8809 is not supported by VS1. Maximum: One. Field Installation: Yes. Prerequisites: See Table 1 for microcode storage requirements and possible requirement for #1901 on Model Group 1.

**Byte Multiplexer Channel (#5248):** The byte multiplexer channel attaches S/370 byte multiplex devices. The data rate of the channel is up to 18K bytes per second for Model Group 1 or up to 36K bytes

per second for Model Group 2 in single byte interleaved mode and up to 500K bytes per second in burst mode. For data rates achievable for specific configurations, see "IBM 4331 Channel Characteristics", GA33-1527 for Model Group 1 or GA33-1535 for Model Group 2. Up to eight control units may be attached. See "Input/Output Attachments" section above for details on subchannels. Limitations: (4331 Model Group 1) Magnetic tape devices may not be attached to the Byte Multiplexer Channel whenever 231X devices are attached to the Block Multiplexer Channel (#1421). Maximum: One. Field Installation: Yes. Prerequisites: For certain control units/devices, the processor requires Power Interface (#5531, #5532). See Table 3.

**Power Interface (#5531), Add'l (#5532):** Provides power control to the 4331 Processor for control units attaching to the 4331 Byte Multiplexer Channel and Block Multiplexer Channel. Table 3 lists the control units/devices for which this feature must be installed in the 4331 Processor -- Power Interface (#5531) allows attachment of up to eight of these control units; Power Interface, Add'l (#5532) allows attachment of eight additional control units for a maximum of 16 per processor. Maximum: One of #5531; one of #5532. Field Installation: Yes. Prerequisites: #5532 requires #5531.

**Table 3 - Control Units/Devices Requiring Power Interface Features**

**Mandatory:**

1255 Magnetic Character Reader  
1270 Optical Reader Sorter  
1275 Optical Reader Sorter  
1287 Optical Reader  
1288 Optical Reader  
1419 Magnetic Character Reader  
1442 Card Read Punch Model N1  
1442 Card Punch Model N2  
1443 Printer Model N1  
2314 Storage Control\* Model A1 and B1  
2314 Direct Access Storage Facility\* Model 1  
2415 Magnetic Tape Unit and Control  
2501 Card Reader Model B1 and B2  
2520 Card Read Punch Model B1, B2 and B3  
2701 Data Adapter Unit  
2702 Transmission Control\*  
2703 Transmission Control\*  
2803 Tape Control  
2821 Control Unit Models 1, 2, 3, 5 and 6  
2822 Paper Tape Reader Control\*  
2840 Display Control\*  
2841 Storage Control  
3272 Control Unit  
3411 Magnetic Tape Unit and Control  
3430 Magnetic Tape Unit and Control  
3505 Card Reader  
3540 Diskette Input/Output Unit  
3704 Communications Controller  
3705 Communications Controller  
3725 Communication Controller  
3791 Controller  
3800 Printing Subsystem  
3803 Tape Control  
3811 Printer Control Unit  
3881 Optical Mark Reader Model 1  
3886 Optical Character Reader Model 1  
3890 Document Processor  
3895 Document Reader/Inscriber

**Not Mandatory, but can utilize Power Interface features:**

3274 Control Unit  
3340 Direct Access Storage Facility  
3370 Direct Access Storage  
3203 Printer Model 5

\* No longer available

**3340/3344 Direct Attachment (#7851%z):** A feature allowing 3340 Model A2s to attach to a DASD Adapter (#3201, #3202). Up to two 3340 Model A2s per system may attach to either adapter. Up to three 3340/3344 Model B units may attach to each 3340 Model A2.

**S/3 Data Import:** With the VSE/IBM System/3-3340 Data Import utility program (5746-AM3), 3348 Data Modules which have been written on a 3340 attached to a System/3 can be read on any direct-attached 3340 drive. The String Switch Capability allows sharing of 3340 Model A2 drives (with #8150 installed) and associated drives, with another IBM processor or control unit that supports the DASD and string switching. String switch support is limited to the static assignment of a shared string to one processor at a time. Limitations: (1) May not be installed if 231X devices attach to the Block Multiplexer Channel (#1421). (2) Attachment of 3340/3344 and/or use of the DAS Compatibility is limited to two strings on the system. (3) If one string of 3340/3344s is attached to a DASD Adapter (#3201), only one string of 3310/3370s can perform DASD emulation. If two strings of 3340/3344s are attached, no 3310/3370s can perform DASD emulation. Maximum: One. Field Installation: Yes. Prerequisites: #3201 - 3340 Model A2. See Table 1 for microcode storage requirements and possible requirement for #1901. Specify: #9315 if String Switch Capability for 3340 required, #9317 if 3344 is installed.

Use of this feature introduces additional processor and channel demands, and can have a significant effect on system performance, particularly in batch environments with heavy I/O load and/or if multi-track operations are used. Performance considerations should be carefully reviewed before proposing use of the 3340/3344.

**Direct Access Storage Compatibility (#7901%z):** Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100Mb/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 mode under DOS, DOS/VSE, OS/VS1 or VM/370, in ECPS:VSE mode under DOS/VSE. Under DOS/VSE data sets in fixed block format and in emulated format can co-reside on the same 3310/3370 volume. With DOS/VSE a variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With OS/VS1 or VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

#### Maximum Number of Emulated Full Volumes:

Compatibility Type	Per Host	Per Vol.	Per String	Per System
2311 on 3310	7		28	56
2314 on 3310	2		8	16
2311 on 3370	34		68	68
2314 on 3370	9		63	63
3330 on 3370	2		16	28
3340 on 3370	3		24	42

For device address assignment refer to "IBM 4331 Compatibility Features", GA33-1528.

**Performance Note:** Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE or VM/370 but not with OS/VS1. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

**Limitations:** (1) Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. (2) Operation of emulation and direct-attached 3340/3344 is limited to two strings on the system. (3) One type of emulation can be activated at IPL time. (4) 3330 Model 11 cannot be emulated. (5) Emulation cannot be used on 3370 drives which are shared via a string switch. (6) VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370. (7) OS/VS1 does not support 2311, native or emulated. (8) On 4331 Model group 2 only: DASD Count-Key-Data (CKD) emulation is not provided if 3370 Model 2 is installed. Program Order: The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, 5745-030 or combined with VSE/Advanced Functions, 5746-XE9. OS/VS1 (5741-VS1) and VM/370 (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. Maximum: One. Field Installation: Yes. Prerequisites: #3201 with 3370 (#9201) and/or 3310 (#9202) specification. See Tables 1 and 2 for microcode storage requirements.

**ECPS:VM/370 (#8701%z):** The 4331 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/370 Release 6 and VM/System Product or VM/BSE Release 2 or VM/SE Release 2 corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction Emulation and Virtual Interval Timer. Limitations: May only operate when S/370 mode has been invoked by IPL. May not be installed with 1401/1440/1460 Compatibility (#3950). Maximum: One. Field Installation: Yes. Prerequisites: See Table 1 for microcode storage requirements and possible requirement for Control Storage Expansion (#1901).

## COMMUNICATIONS AND LOOPS

**Communications Adapter:** Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1527 for Model Group 1 or GA33-1535 for Model Group 2. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 64,000 bps and may operate concurrently with other lines provided that its data rate does not exceed 50,000 bps and the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/370. Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-KeyBoard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half-speed operation for synchronous lines only (for both clocked and non-clocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the CE:

- Duplex instead of half-duplex connection (two-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High-speed operation for one line (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

**Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communications facilities and services.

**Communication Facilities:** See M2700 pages for communications facility requirements with this feature.

## TERMINALS SUPPORTED

The Data Communications Equipment and remotely attachable Data Terminal Equipment (abbreviated "terminals") supported by the Communications Adapter are shown in the table below:

### SDLC Terminals Supported:

Type	Speed in K bps
4.8-----	-----4.8/2.4
2.4/1.2----	-----7.2
2.4-----	-----7.2/3.6
1.2/.6-----	-----9.6
	-----20.4-64
v v v v	v v v v v

### Terminals:

3271-11,-12	
(3)	X X X X X X X X
3274-1,X1C(8)	X X X X X X X X X
3274-52C	X X X X X X X X
3276-1-4 (7)	X X X X X X X X
3275-12 (3)	X X X X X X X X
3276-11-14	X X X X X X X X
3601	X X X X X X X X
3602	X X X X X X X X
3614	X X X X X
3624	X X X X X
3631	X X X X X X X X
3632	X X X X X X X X
3651-25,75	X X X X
3651-A50,B50	X X X X
3651-A60,B60	X
3661	X
3684	X X X X X
3694	X X X X X X X X
3767-1-3	X X X
3771-1-3	X X X X X

3773-1-3	X X X X X
3773-P1-P3	X X X X X
3774-1,2	X X X X X
3774-P1,P2	X X X X X
3775-1,P1	X X X X X
3776-1,2	X X X X
3776-3,4	X X X X X X X X
3777-1,3	X X X X X X X X
3791	X X X X X X X X
3791/3730	X X X X X X X X
3791/3760	X X X X X X X X
4701-1,5	X X X X X X X X
4730	X X X X X X X X
4736	X X X X X X X X
6670	X X X X X X X X
7426-1 (10)	X X X X X X X X
8775-11,12	
(10)	X X X X X X X X
8815	X X X X X X X X
Controllers:	
3705 (1)(3)	X X X X X X X X X
3725	X X X X X X X X X
Systems:	
4331 (2)	X X X X X X X X X
5285 (9)	X X X X X
5288 (9)	X X X X X
5320 (5)	X X X X X X X
5340 (6)(9)	X X X X X X X X X
5360 (6)(9)	X X X X X X X X X
5362 (6)(9)	X X X X X X X X X
5380 (5)	X X X X X X X X X
8100	X X X X X X X X X (4)

### Notes:

1. 3705 or 3725 supported as a primary station in a network using ACF/VTAM Release 1 or ACF/VTAM Release 2.
2. Participant as a primary or a secondary station in a network using ACF/VTAME.
3. Not supported by ACF/VTAME.
4. 48,000 bps.
5. Supported as a 3770.
6. Supported as a 3770 or 3791.
7. With SDLC/BSC Switch in SDLC mode.
8. The maximum speed supported is 56K bps.
9. Supported as a 3274 Model 1C or 3770
10. DSLU (5668-006) is required for 7426 or 8775-11, -12 with downstream loadable functions.

### BSC Terminals Supported:

Type	Speed in K bps
4.8-----	-----4.8/2.4
2.4/1.2----	-----7.2
2.4-----	-----7.2/3.6
1.2/.6-----	-----9.6
	-----20.4-64
v v v v	v v v v v

### Terminals:

2715-2	X X X X X
3271-1,-2	X X X X X X X X
3274-X1C	X X X X X X X X
3275-2 (1)	X X X X X X X X
3276-1-4	X X X X X X X X
3631 (7)	X X X X X X X X
3632 (7)	X X X X X X X X
3651-25,75	X X X X
3651-A50,B50	X X X X
3651-A60,B60	X
3661	X
3684-1,2	X X X X X
3741-2,4	X X
3747	X X

3771 (2)	X	X	X	X	X			
3773-1-3 (2)	X	X	X	X	X			
3773-P1,P3 (2)								
	X	X	X	X				
3774,3775 (2)	X	X	X	X	X			
3776-1,2 (3)	X	X	X	X				
3777-1,2 (3)	X	X	X	X	X	X	X	X
3780	X	X	X	X	X	X		
4701-1	X	X	X	X	X			
4730	X	X	X	X	X			
5110 (12)	X	X	X	X	X	X		
5231-2 (9)	X	X	X	X	X			
5285	X	X	X	X	X			
5288 (13)	X	X	X	X	X			
5937 (11)	X	X	X	X	X	X		
6670	X	X	X	X	X	X		

Controllers:

2701								
(w 360/370)	X	X	X	X	X	X		
3704	X	X	X	X	X	X	X	X
3705	X	X	X	X	X	X	X	X

Systems: (5)

3115	X	X	X	X	X	X	X	(1)
3125	X	X	X	X	X	X	X	(1)
3135	X	X	X	X	X	X		
3138	X	X	X	X	X	X		
4331	X	X	X	X	X	X	X	X
5010 (8)	X	X	X	X	X	X		
5285 (14)	X	X	X	X	X			
5288 (14)	X	X	X	X	X			
5320 (8)	X	X	X	X	X			
5340 (14)	X	X	X	X	X	X	X	X
5360 (14)	X	X	X	X	X	X	X	X
5362 (14)	X	X	X	X	X	X	X	X
5380 (8)	X	X	X	X	X	X	X	
5404	X	X	X	X	X	X	X	
5406	X	X	X	X	X	X	X	
5408	X	X	X	X	X	X	X	
5410	X	X	X	X	X	X	X	
5412	X	X	X	X	X	X	X	
5415	X	X	X	X	X	X	X	
8100 (4)	X	X	X	X	X	X	X	
Series/1 (8)	X	X	X	X	X	X	X	X

Notes:

1. By RPQ.
2. Equivalent to 2770/2772.
3. Equivalent to 2770/3780.
4. Supported as a 3276 Model 1, 2, 3, 4, nonswitched connection only.
5. With Communications Adapter.
6. 19,200 - 64,000 bps in line position 1.
7. See M3631 and/or 3632 pages for 3631/3632 features required and software requirements for host connection.
8. Equivalent to 54XX (S/3).
9. Equivalent to 3741 Model 2, 4.
10. Equivalent to 3275 Model 1, 2.
11. Equivalent to 3271 Model 1, 2.
12. Supported as a 2772.
13. Supported as a 3280.
14. Supported as a 3271 Model 2.

**Start/Stop Terminals Supported:** Only terminals using IBM Terminal Control - Type 1 are supported.

Type	IBM I	Line	Control	Speed in bps				
		75	134.5	300	600	1200		
2740-1		X						
2740-2	X	X				X		
2741		X						

3767-1 (1)	X	X	X	X
3767-2 (1)	X	X	X	X
3767-3 (1)	X	X	X	X
5100 (2)	X	X		
5110	X	X		
(Canada only)				
6733 (3)		X		X<)
CMCST (1)	X	X		

Notes:

1. Equivalent to 2740 and/or 2741: Speed 134.5 bps needs 3767 RPQ.
2. Equivalent to 2741.
3. (Canada only) > Supported as a CPT-TWX 33/35. <

**Autocall Unit Interface (#1020%*x*):** Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. Limitations: Does not operate with High-Speed Modem Adapter (#4720), any features with 1200 bps Integrated Modem or with any nonswitched lines. Maximum: Two. Cable Order: Required, for attachment to external equipment. Field Installation: Yes. Prerequisites: #1601 and #3701 (in switched operation) for each Autocall Unit Interface installed. #2835 is required to permit attachment to PTT-supplied Automatic Calling Units in certain countries. Specify: Line position, see Table 4 below.

**Communications Adapter, Base (#1601%*x*):** Allows attachment of up to eight lines (with up to two transmission modes) plus Autocall Unit Interfaces (#1020) for up to two of the lines. The aggregate data rate capability of the Communications Adapter is 64,000 bps. Limitations: (1) SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. (2) Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. (3) The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines refer to "IBM 4331 Processor Channel Characteristics" GA33-1527 (Model Group 1) or GA33-1535 (Model Group 1) which contains tables of pre-analyzed configurations. Maximum: One. Field Installation: Yes. Prerequisites: #1001 is required when more than three telecommunications line features are attached. See Table 1 for microcode storage requirements and possible requirement for #1901 (4331 Model Group 1). Specify: See Table 4, "Communications Adapter Configuration Features and Position Codes", for required specify codes for each line feature attached.

**(Except Canada and Japan > 1200 bps Integrated Modem, Switched With Auto Answer (#2831%*x*) <):** (Except Canada and Japan > This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the customer engineer for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Connection to the switched network is made via an integrated Public Switched Feature (World Trade Line Plate). Maximum: Three. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: #1601 and #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4 for Line Position Code and Transmission Mode Codes. <)

**(Except Canada > 1200 bps Integrated Modem, Nonswitched (#2832%*x*) <):** (Except Canada > This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. Cable Orders: Required for attachment

to external equipment. Maximum: Eight. Field Installation: Yes. Prerequisites: #1601 and #4696. Specify: SDLC and/or BSC and/or Start/Stop operation are possible. < > (Japan only) One specify code #2943 is required for each #2832 which attaches to NTT D-1 services. If two feature #2832s attach to NTT D-1 services, then two #2943s must be specified. This provides NTT Quick Disconnect and network wrap capability. (Start/Stop communications are not supported with NTT D-1 services.) < >

**Communication Line Isolation (#2835):** Provides an isolation barrier between the modems or Automatic Calling Units and the Communications Adapter, as required by certain World Trade Countries. Up to ten isolation barriers are available and may be used for one Remote Support Facility (#2833), up to two Autocall Unit Interfaces (#1020), up to eight EIA/CCITT Interfaces (#3701) up to two Data Link Adapters (#4840). Maximum: One. Cable Order: Required for each isolation barrier (up to 10). Field Installation: Yes. Prerequisites: Must be associated with at least one #2833, #1020 or #3701.

**EIA/CCITT Interface (#3701%*x*):** This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Non-Clocked Modems (#4696), then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. Maximum: Eight. Cable Order: Required, for attachment to external equipment. Field Installation: Yes. Prerequisites: #1601. One #4695 or #4696 is required for each feature #3701 installed. #2835 is required to permit attachment to PTT communications facilities in certain countries. Specify: Start/Stop, SDLC and/or BSC operations are possible. See Table 4 for Line Position Code and Transmission Mode Codes.

**Loop Adapter:** Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General Purpose Terminals 3104 Models B1, B2, 8775 Models 1, 2, 3232 Keyboard Printer Model 11, 3287 Models 11, 12 and 3268 Printers Model 2 and/or Control Units 3274 Model 51C, 52C, 61C, 7426 Terminal Interface Unit Model 1 with its associated terminals and 3276 Models 11-14 with the associated terminals to the 4331 Processors. Loop Adapter 1 and 2 (#4830, #4831) provide for direct attachment. A maximum of two Data Link Adapters (#4840) provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter (#4840) can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct-attached loops at 9600 bps or data link-attached loops at 2400, 4800 or 9600 bps are the following:

#### Device Attachments:

- 3104 Display Terminal Models B1, B2
- 3232 Keyboard Printer Model 11
- 3641 Reporting Terminal Models 1, 2
- 3642 Encoder Printer Models 1, 2
- 3643 Keyboard Display Models 2, 3, 4 including #4920 Badge and Document Encoder
- 3644 Automatic Data Unit
- 3645 Printer
- 3646 Scanner Control Unit
- 3647 Time and Attendance Terminal
- 8775 Display Terminal Models 1, 2
- 3287 Printer Models 11, 12
- 3274 Control Unit Model 51C, 52C with the associated terminals
- 3276 Control Unit Display Station Models 11-14 with the associated terminals

#### Control Units and Associated Terminals:

- 3274 Control Unit Model 51C, 61C
  - 3178 Display Station
  - 3179 Model 1 Color Display Station (base color)
  - 3179 Model G1, G2 Color Graphics Display Station
  - 3180 Model 1 Display Station
  - 3191 Model A1X, B1X, D1X, D3X Display Station
  - 3192 Model C1X, C3X, D1X, D3X, F1X, F3X, Display Station
  - 3278 Display Station
  - (Canada only > 3270 Personal Computer \*\* (Control Unit Mode mode only) < >)
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3268 Printer Model 2 and 2C
  - 3287 Printer
  - 3289 Line Printer
  - Personal Computer XT/370 (5160 Model 589) (Control Unit Terminal Mode only) \*\*
  - Personal Computer AT/370 (5170 Model 599 and 739) (Control Unit Terminal Mode only) \*\*
  - 5150/5160/5170 PC with 3278/3279 Emulation Adapter
  - 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*\*
  - 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*\*
  - 5210 printer Models G01, G02
- 6580 Displaywriter System, Model A04, A06, A08, A10 (25-line display)
- 6580 Displaywriter System, Model B04, B06, B08, B10 (66-line display)
- 3274 Control Unit Model 52C
  - 3178 Display Station
  - 3180 Model 1 Display Station
  - 3268 Printer
  - 3278 Display Station
  - 3283 Printer
  - 3287 Printer
- 6580 Displaywriter System, Model A04, A06, A08, A10, (25-line display)
- 6580 Displaywriter System, Model B04, B06, B08, B10 (66-line display)
- 3276 Control Unit Display Station Model 11-14
  - 3178 Display Station
  - 3179 Color Display Station (base color)
  - 3180 Model 1 Display Station
  - 3278 Display Station
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3268 Printer Model 2, 2C
  - 3287 Printer
  - 3289 Line Printer with its associated terminals
- 6580 Displaywriter System, Model A04, A06, A08, A10 (25-line display)
- 6580 Displaywriter System, Model B04, B06, B08, B10 (66-line display)
- 7426 Terminal Interface Unit Model 1

In addition the following devices can be attached at 38,400 bps:

- 3104 Display Terminal Models B1, B2
- 8775 Display Terminal Models 1, 2
- 3232 Keyboard Printer Model 11
- 3287 Printer Models 11, 12
- 3274 Control Unit Model 51C, 52C with the associated terminals
- 7426 Terminal Interface Unit Model 1 with its associated terminals

(Canada only > \*\* Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer or Personal Computers XT/370 and AT/370. < >)

For the attachment of 3640 terminals, it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct-attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps.

For data link-attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, "IBM Multiuse Communications Loop Planning Guide".

**Loop Installation:** For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the "IBM Multiuse Communications Loop Planning Guide", GA23-0038, and "Installation Guide", GA23-0039. See also installation tool "CFLOOP" announced with letter P81-78. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to "IBM 4331 Processor Loop Adapter Feature, Operating Procedures", GA33-1538, and "Problem Determination Procedures", GA33-1540.

**Notes:**

1. Loop Accessories are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See "Accessories" section for details and ordering information.
2. An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N 1657320.

Communications Facilities: See M2700 pages for communications facility requirements.

**Loop Adapter 1 (#4830):** Provides for direct attachment of a Loop with one or two Lobes. (The lobe is the actual physical Loop cable.) Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals and/or 3274-51C, 52C, 61C and/or 3276 Control Units or 38.4K bps for 3104 and/or 7426 Terminal Interface Unit Model 1 with its associated terminals 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals and/or 3274-51C, 52C, 61C Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: One. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: #1001.

**Loop Adapter 2 (#4831):** Provides for direct attachment of a Loop with one or two Lobes. (A lobe is the actual physical Loop cable.) Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 3104 and/or 8775 and/or 7426 Terminal Interface Unit Model 1 with its associated terminals and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals, and/or 3274-51C, 52C, 61C and/or 3276 Control Units, or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals and/or 3274-51C, 52C, 61C control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: One. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: #4830.

**Data Link Adapter (#4840):** Allows connection of one or more 3843 loop control units to the 4331 processor. The feature provides for the attachment of one external modem complying with EIA/CCITT recommendations. CCITT V.24/V.28 support will be provided for nonswitched lines only or a PTT-mandatory modem complying with CCITT recommendations. Transmission speed can be 2400, 4800, or 9600 bps, with half-speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link-attached loops. Support will be provided for the same terminals as on the direct-attached loop. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: Two. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: Loop Adapter 1 (#4830). #2835 is required to permit attachment to PTT communications facilities in certain countries.

(Japan only>One external cable (P/N 8482935) is required when attached to NTT or independent supplier modems in order to meet the self test requirements.<)

**Loop Adapter Logic Storage Requirements:** The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 (#4830, #4831) or Data Link Adapters (#4840) has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Micro- code Prog. Space Bytes	Sys. Ctrl Space Bytes
Microcode Base	42836	7880
1 or mult. 3641 and/or 3647	7800	1060
1 or mult. 3642	5900	580
1 or mult. 3643 w/o #4920	8800	3450
1 or mult. 3643 w/#4920	9400	3450
1 or mult. 3644	4900	-
1 or mult. 3646	2900	256
1 or mult. 3104 and/or 8775 and/or 3287, 3274, 3276, 3645, 7426	2600	-
Terminal*		Ctrl Space
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204
	-----	-----
	Total 1	Total 2

\* For additional information on buffer space refer to the "IBM 4331 Loop Adapter Characteristics", GA33-1534.

The storage requirements need to be validated by DP because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

**System Diskette Space Requirements:** When attaching the Loop Adapter feature with 364X terminals to the IBM 4331 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3876, an invalid configuration has been selected. A trade-off between features must be considered.

4331 Processor Feature/Facility	System Diskette Records
4331 Basic	2061
DASD Adapter (#3201, #3202)	251
3310 or 3370 Common (#9202, #9201)	71
3310 Att. (#9202)	63
3370 Att. (#9201)	61
3340/3344 Direct Att. (#7851)	73
3340 Att. or DAS Compatibility (#7851 or #7901)	24

DAS Compatibility (#7901)	190
8809 Tape Adapter (#4910)	87
Communications Adapter (#1601)	272
S/S Transmission Mode (#968x)	15
BSC Transmission Mode (#967x)	18
SDLC Transmission Mode (#969x)	52
Inline (System RAS Test Functions, req'd. by CE)	40
1400/1440/1460 Compatibility (#3950)	60
ECPS: VM/370 (#8701)	26
High-Speed BMPX Channel (#1431)	50
Loop Adapter Common (#4830, #4831, #4840)	448
3640 Terminal Att. (#9251, #9252, #9253, #9254, #9256)	252

The maximum number of system diskette records may not exceed 3,876.

**Maximum Number of Terminals Attachable Via Loop Adapters/Data Link Adapter:** The maximum number of terminals that can be attached to the 4331 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775, 3232 Model 11 terminals or 3274-51C, 52C, 61C, or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see "IBM Multiuse Communications Loop Planning Guide", GA23-0038.

**Line Attachment Base For Clocked Modems (#4695%):** This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-Terminating Equipment) which provide clocking and comply with CCITT V.24/V.28 V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network (X.21bis support is available through features #3701 and #4720). See the various line features below to determine when it is required. Limitations: A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4695 installed reduces by one the number of feature #4696 allowable. Maximum: Eight, one per line installed. Field Installation: Yes. Prerequisites: #1601 -- #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

**Line Attachment Base For Non-Clocked Modems (#4696%):** This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-Terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

Start/Stop: 75, 300, 600 or 1200 bps  
BSC: 600 bps  
SDLC: 600 bps

For BSC or SDLC operations, if 1200 bps is wired, then full-speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. Limitations: A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4696 installed reduces by one the number of feature #4695 allowable. Maximum: Eight, one per line installed. Field Installation: Yes. Prerequisites: #1601. Feature #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

**High-Speed Modem Adapter (#4720%):** Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 64,000 bps. Limitations: For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see "IBM 4331 Channel Characteristics", GA33-1527 (Model Group 1) or GA33-1535

(Model Group 2). Cannot be installed with 231X DASD attached to the Block Multiplexer Channel (#1421). Cannot be installed with X.21 Adapter for Nonswitched Networks (#5655) if its speed is 48,000 bps #9831. Maximum: One. Cable Order: Required for attachment to the external modem. Field Installation: Yes. Prerequisites: #1601 and #4695. Specify: BSC and/or SDLC operations are possible -- see Table 4 for Line Position Code and Transmission Mode Codes.

**(Canada only) >1200 bps Integrated Modem, Nonswitched (#4781%):** This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. Cable Orders: Required for attachment to external equipment. Maximum: Eight. Field Installation: Yes. Prerequisites: #1601 and #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

**1200 bps Integrated Modem, Switched With Auto Answer (#4782%):** This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to < (Canada only) > a Data Access Arrangement type CBS (or equivalent). < (Canada only) > Maximum: Eight. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: #1601 and #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

**1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Manual Answer (#4787%):** This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC-registered equivalent for manual answer. Maximum: Eight. Cable Order: Required for one cable group which connects to nonswitched line and to the switched network. Field Installation: Yes. Prerequisites: #1601 and #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4.

**1200 bps Integrated Modem, Nonswitched With Switched Network Backup And Auto Answer (#4788%):** This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC-registered equivalent for auto answer. Maximum: Eight. Cable Order: Required for one cable group which connects to the nonswitched line and to the switched network. Field Installation: Yes. Prerequisites: #1601 and #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 4. < )

**Local Attachment Interface (#4801%):** Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may

be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps  
400 meters at 2400 bps  
200 meters at 4800 bps  
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. Cable Order: Required for attachment to terminal plate. Customer-supplied cable for in-door use. Maximum: Eight. Field Installation: Yes. Prerequisites: #1601 and #4695. Specify: SDLC and/or BSC operations are possible, see Table 4.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides controls and circuits for attachment of one X.21 Point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. Limitations: If feature #5655 operates at 48,000 bps (specify #9831), then the following limitations apply: (1) High-Speed Modem Adapter (#4720) cannot be installed. (2) 231X DASD attached to the Block Multiplexer Channel (#1321) cannot be installed. (3) For speed limitations, refer to the Communications Adapter Base feature description. Maximum: Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. Field Installation: Yes. Prerequisites: #1601 -- one #4695 is required for each #5655 installed. Specify: SDLC operation must be specified for this feature -- see Table 4 for line position, transmission mode and transmission speed codes. Note: #9831%*x* is required for 48,000 bps operation. Cable Order: Required for attachment to external equipment.

Table 4 - Comm. Adapter Config. Feat. and Position Codes

(Part 1 of 2)	Req'd Line Pos. Feat Line with Line Num- Att Pos. Codes ber Base 1 2			
	% <i>x</i>	% <i>x</i>	% <i>z</i>	% <i>z</i>
EIA/CCITT Inter- face (for Clock- ed Modems) (6)	3701	4695	9531	9532
EIA/CCITT Inter- face (for Non- clocked Modems) (6)	3701	4696	9521	9522
High-Speed Modem Adapter (7)	4720	4695	9501	
1200 bps Inte- grated Modems:				
Nonsw w SNBU and Auto Answer	4788	4696	9641	9642
Nonsw w SNBU and Manual Answer	4787	4696	9631	9632
Switched with Auto Answer	4782	4696	9651	9652
Nonswitched	4781	4696	9661	9662
X.21 Adapter for Nonsw Networks	5655	4695		
2400-9600 bps			0931	0932
48,000 bps			9831	
X.21 Adapter for Nonsw Networks	5655	4695		
2400-9600 bps			9711	9712
48,000 bps			9831	
(Except Canada> Switched with Auto Answer (4)	2831	4696	0901	0902
Nonswitched (9)	2832	4696	0911	0912<
Local Attachment	4801	4695	9451	9452

Interface Autocall Unit	1020				
Interface (3)					
First		9541	9542		
Second		9551	9552		
Trans. Mode (5)					
BSC (1)		9671	9672		
Start/Stop (2)		9681	9682		
SDLC (1)		9691	9692		

(Part 2 of 2)	Line Position with Line Position Codes				
	4 % <i>z</i>	5 % <i>z</i>	6 % <i>z</i>	7 % <i>z</i>	8 % <i>z</i>
EIA/CCITT In- terface (for Clocked Modems) (6)	9534	9535	9536	9537	9538
EIA/CCITT In- terface (for Non-clocked Modems) (6)	9524	9525	9526	9527	9528
1200 bps Inte- grated Modems:					
Nonsw w SNBU and Auto Answer	9644	9645	9646	9647	9648
Nonsw w SNBU and Manual Answer	9634	9635	9636	9637	9638
Switched with Auto Answer	9654	9655	9656	9657	9658
Nonswitched	9664	9665	9666	9667	9668
X.21 Adapter for Nonsw Networks					
2400-9600 bps	0934	0935	0936	0937	0938
X.21 Adapter for Nonsw Networks					
2400-9600 bps	9714	9715	9716	9717	9718
(Except Canada> Switched with Auto Answer (4)	0904	0905	0906	0907	0908
Nonswitched (9)	0914	0915	0916	0917	0918
Local Att. Interface Autocall Unit Interface (3)	9454	9455	9456	9457	9458
First	9544	9545	9546	9547	9548
Second	9554	9555	9556	9557	9558
Trans. Mode (5)					
BSC (1)	9674	9675	9676	9677	9678
Start/Stop (2)	9684	9685	9686	9687	9688
SDLC (1)	9694	9695	9696	9697	9698

Notes:

1. BSC or SDLC transmission mode with any line attachment feature.
2. Start/Stop transmission mode only with EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696) or with any other features offering 1200 bps Integrated Modems (with prerequisite #4696). (Japan only> Start/Stop transmission mode not available with NTT D-1 services (#2832 with #2943).<)
3. Must be associated with EIA/CCITT Interface (#3701 and prerequisite #4695 or #4696). Maximum of two #1020s may be installed.
4. Maximum of 3 can be installed; no line position limitation.
5. The aggregate data rate of the Communications Adapter is 64,000 bps -- Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage -- see Table 1 for micro-

- code storage requirements and possible requirement for Control Storage Expansion (#1901).
6. (Japan only) One external cable P/N 8482935 is required for each #3701 which attaches to NTT or Independent-supplier modems. See Cable Order Form. <
  7. May not be installed when 231X DASD is attached to the Block Multiplexer Channel (#1421).
  8. When changing #9444 to/from #9471, no new hardware or diskette is required.
  9. One specify code #2943 is required for each #2832 which attaches to NTT D-1 services. (If two feature #2832s attach to NTT D-1 services, then two #2943s must be specified.) This provides NTT Quick Disconnect and network wrap capability.

Legend:

%x: Feature supplies diskette for System Diskette facility.

%z: System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette.

## MODEL CONVERSIONS

\* UPGRADES FROM 4321/4331 TO 4361 PROCESSORS ARE NO LONGER AVAILABLE.

For model upgrade from the 4331 to a 4361 processor, refer to the M4361 pages.

**Model Conversions within Model Group:** Can be made in the field.

**Model Group Conversions:** Customer price quotation and customer order acknowledgement letters for purchase model upgrades must State:

"Installations of this model upgrade involves the removal of parts which become the property of IBM."

Field upgrade from 4331 Model Group 1 to 4331 Model Group 11 is possible -- refer to M4331-11 section.

Field upgrade from 4331 Model Group 1 to 4331 Model Group 2 is possible -- see below.

Field downgrade from 4331 Model Group 2 to 4331 Model Group 1 is not recommended. Field downgrade from 4331 Model Group 11 to 4331 Model Group 1 is not recommended. Refer to Equipment Orders in the GI section for details of this "Not Recommended for Field Installation" classification.

**Field upgrade from 4331 Model Group 1 to Model Group 2:** For upgrade of a purchase 4331 Model Group 1 processor to Model Group 2, conversion RPQ number 7B0697 is required in addition to the Model upgrade MES if Control Storage Expansion (#1901) is not installed or on order for installation prior to the Model upgrade installation.

## ACCESSORIES

**Console Table:** An operator workstation with modesty skirt has capabilities for two operators with two 3278 Model 2A/3279 Model 2C and room for reference material. Attachable book racks may be ordered for manual storage and also serves as a cable control device for the 3278 Model 2A/3279 Model 2C, telephones, etc. Table dimensions are 1590mm x 815mm and is equipped with gliders. For field installation, order feature via MES specify on the 4300:

4300 Processors Console Table Accessory, #1550  
4300 Processors Bookrack and Cable Holder, #1480

Console table will be supplied in the same color as the basic machine. It is available only on a purchase basis.

**Loop - Accessories:** A group of accessory products are offered to permit plant electricians or contract personnel to install the loops.

Refer to "IBM Multiuse Communications Loop Planning and Installation Guide", GA23-3341, for information necessary to plan the layout and for selection of the loop hardware, for installation and testing information.

**Loop Splice Plate (LSP):** The LSP splices together two segments of indoor cable or provides a connecting point for future expansion of the loop. The LSP consists of a single connector strip, to which the incoming loop cable and the outgoing loop cable can be attached; it is installed in a standard outlet box for business office environments, or weatherproof outlet box for industrial environments.

**Loop Station Connector (LSC):** The LSC is available as two unique types: Wrap and radial. The wrap LSC attaches an I/O unit or controller directly to the main loop cable; the radial LSC attaches an I/O unit only through an LWC to the loop. The wrap LSC attaches an incoming and outgoing loop cable; the radial LSC attaches at the end of one loop cable from the LWC.

The wrap LSC also offers the isolation feature of wrapping, which allows the customer to wrap the loop away from a loop wiring failure or to reconfigure the loop during alterations. Both wrap and radial LSCs contain bypass relays that bypass the I/O unit when the I/O unit is powered-off or disconnected. These accessories are installed in a standard or weatherproof outlet box.

**2 X 4 Adapter Plate (2AP):** The 2" X 4" Adapter Plate is used with the Loop Station Connector and accommodates the use of standard outlet boxes that have dimensions smaller than the outlet boxes defined in the "Loop Installation and Planning Guide". It is not to be used with the environmental boxes.

**Loop Wiring Concentrator (LWC):** The LWC provides the facility to attach a cluster of I/O units without a large number of drops on the loop cable. It attaches up to eight radial LSCs at the end of loop cables called radials. The point where a radial line terminates at the LWC is called an LWC port. Not all ports have to be used; unused ports can be reserved for future expansion.

The LWC has the same wrapping capability as the wrap LSC. In addition, the LWC allows the customer to bypass one or more of the radials by setting a corresponding switch located inside the LWC.

The LWC has its own enclosure or can be mounted in a NEMA-4X environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

**Loop Surge Suppressor (LSS):** The LSS allows the loop to be run across an outdoor space to another building. It attaches two outdoor cables and two indoor cables, allowing the proper termination and grounding for each type of cable. In addition, the LSS contains four surge protectors, one for each twisted pair in the two outdoor cables, to protect from voltage surges caused by near strikes of lightning. There is no protection in the LSS from a direct lightning strike.

The LSS has its own enclosure or can be mounted in an environmental equipment cabinet, with minimum measurement of 36x30x15cm (14x12x6 in.).

**Continuity And Relay Tester:** The Continuity and Relay Tester is used with a customer-supplied volt-ohm meter, capable of reading 0.5 ohms and rated at least 5,000 ohms/volt, to verify the loop installation, including loop cabling and accessories, after completion. By plugging the tester into any loop station connector and connecting the volt-ohm meter to the tester, the condition of the wire segment being tested can be determined as to conductor and shield continuity (opens or shorts), wrap switch operation, and total lobe resistance.

The loop station connector relays are also activated and their operation verified with this tester.

System Loop Accessories P/N  
Order via MES from Raleigh:

Loop Splice Plate (LSP)	
(indoor)	1657300
Loop Station Connector	

(Radial LSC)	1657310
Loop Station Connector	
(Wrap LSC)	1657320
Loop Station Connector Gasket	1657260
Loop Wiring Concentrator (LWC)	1657330
LWC Circuit Board Assy (order instead of LWC-1657330)*	1657332
Loop Surge Suppressor (LSS)	1657350
LSS Circuit Board Assy (order instead of LSS-1657350)*	1657354
Continuity and Relay Tester	1657420
Wrap Switch Access Cover	1657325
Loop Accessory Keys	
(10 spares) **	1657379
2 X 4 Adapter Plate (2AP)	7838771
Order via MES from Fujisawa:	
Conventional Box (indoor)	
5 x 10cm - (2 x 4 inches)	2102151
Clamp (for cable to indoor box)	2100264
Environmental	
Box (outdoor)	
7 x 11.5cm - (2.75 x 4.5 in.)	
(For industrial use)	1657280
Environmental	
Clamp - small (for indoor cable to environmental box)	2114285
Environmental	
Clamp - large (for outdoor cable to environmental box)	1657377
Metric conduit adapter	1657292
Environmental Enclosure-NEMA-4X	
36x30x15cm (14x12x6 in.)	1657305
Environmental Enclosure	
Mtg Panel	1657306
Sealing - Locknut	1657307

\* For use with NEMA-4X enclosure and associated parts (used when installing in harsh environments) or as a replacement part for the LWC or LSS.

\*\* 1 package (10 keys) shipped with each 43XX with Loop Adapter 1 (#4830), 1 key shipped with each LWC and wrap LSC.

Ordering Instructions: Order via MES from location indicated above. When ordering use Machine type 43XX with Loop Adapter 1 (#4830).

Warranty: All loop accessories are warranted free from defects of workmanship and materials for 90 days.

Customer Responsibilities: The customer is responsible to provide (purchase, install, test, and maintain) the loop cables and accessories for terminal attachments. However, see local CE management and GI section 65 for contracts available to assist the customer with installation.

The customer is also responsible for procuring and stocking spare cable and spare parts for loop accessories.

See "IBM Multiuse Communications Loop Planning and Installation Guide" (GA27-3341), for a suggested schedule to allow the customer to plan, install, and test the loop cable and accessories prior to delivery of the system.

It is recommended that the customer order additional loop components for spares with the initial order, as spares will not be stocked in the Branch Office.

To enable a customer to test his installed loops it is recommended that the customer order a Continuity and Relay Tester. Testing the loop wiring will require the tester or its equivalent.

**Loop - Cables:** Loop Cables may be purchased from IBM or a customer selected source. See "IBM Multiuse Communication Loop Planning and Installation Guide", GA27-3341, for part numbers, specifications and usage which is necessary for pre-planning and ordering.

- Indoor Cable P/N 1657265: UL approved (style 2919) for interconnection of low voltage electronic equipment. Maximum allowable cable temperature range is -34 degrees C. to +80 degrees.
- Indoor Cable P/N 7838694: UL approved for cable tray installation (NEC Art. 725-40b3). Maximum allowable cable temperature range is -34 degrees C. to +90 degrees C.
- Indoor Cable P/N 7838695: UL approved for duct and plenum installation (NEC Art. 725-2b). Maximum allowable cable temperature range is -34 degrees C. to +105 degrees C.
- Outdoor Cable P/N 1657267: For above ground installation. Maximum allowable cable temperature range is -34 degrees C. to +80 degrees C.
- Outdoor Cable P/N 1657268: For below ground installation. Maximum allowable cable temperature range is -34 degrees C. to +80 degrees C.

#### Ordering Instructions:

- Interior cable (P/N 1657265, 7838694 and 7838695): Should be ordered in lengths of 304.8m to 609.6m (1,000 to 2,000 ft). Additional lengths up to 609.6m (2,000 ft) can be ordered by specifying the length wanted. Indoor cable splices can be accomplished via P/N 1657300. A minimum order quantity is 304.8M (1,000 feet).
- Exterior cable (P/N 1657267 and 1657268): Should be ordered in one continuous length, up to a maximum of 914.4m (3,000 feet), by specifying the length wanted. Outdoor splices with aerial and burial cable should be avoided. Order via MES from Fujisawa. Allow lead time of 120 days.

Warranty: Loop cable is warranted free from defects of workmanship and materials for 90 days.

## 4331 PROCESSOR MODEL GROUP 11

(NO LONGER AVAILABLE)

The 4331 Model Group 11 is no longer available -- MES orders for upgrades, features, released RPQs and accessories are not affected. No new RPQs will be accepted.

### PURPOSE

Provides the power, control, logic and memory circuitry necessary for the arithmetic, logic and processor storage functions of the 4331 Processor models, including I/O channels and integrated adapters.

### MODEL GROUP 11

**Model J11:** 1,048,576 bytes of Processor Storage -- 4,096 bytes of Buffer Storage.

**Model K11:** 2,097,152 bytes of Processor Storage -- 4,096 bytes of Buffer Storage.

**Model L11:** 4,194,304 bytes of Processor Storage -- 4,096 bytes of Buffer Storage.

**Prerequisites:** Each system requires an operator's display, keyboard and control panel to allow Initial Microcode Load (IML) and interaction with the hardware/software system. A 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C with keyboard and control panel is required for this purpose.

**Maximum Configuration:** The channel load of the attached I/O devices has to be checked against the load limitations of the processor. Refer to "IBM 4331 Processor Channel Characteristics", GA33-1550 or use the HONE aid ANCHLOAD.

### HIGHLIGHTS

The 4331 Model Group 11 is a featured processor with up to four megabytes of processor storage and contains the following standard hardware features:

Feature Number on Model Group 1 and 2	
One block multiplexer channel	#1421
Communications Adapter Base	#1601
128K bytes of control storage	#1901*
Display/Printer Adapter	
Expansion (16 ports)	#2001
One DASD adapter (3310, 3370 A1 attachment)	#3201
One 8809 adapter	#4910
One byte multiplexer channel	#5248
Power Interface	#5531
3340/3344 Direct Attachment	#7851
ECPS:VM/370	
(VM assist microcode)	#8701

\* Model Group 1

These features are not ordered separately. The processor can contain up to 4,194,304 bytes of monolithic processor storage. Data flow is four bytes parallel. Processor fetch and store cycles for the buffer are each 200 nanoseconds for four bytes. Buffer storage is automatically replenished from processor storage in 64 byte units at a time. The 64-byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.1 microseconds. The processor is microcode controlled.

**Note:** The microcode which controls system operations resides in Processor Storage, Reloadable Control Storage and Read-Only Storage. 4331 Model Group 11 includes 131,072 bytes of Control Storage plus 12,288 bytes of Read-only Storage. In addition to the microcode contained in this storage, approximately 200,000 bytes of Processor Storage are occupied by microcode, RAS workspace and system data.

### Standard Functions:

- Processor storage: 1,048,576, 2,097,152 or 4,194,304 bytes for Model Group 11. Approximately 200,000 bytes of processor storage are allocated for system/microcode use. The 4331 Model Group 11 configurations require a portion of processor storage to be allocated for system microcode use. See Table 1 for details.
- ECPS:VSE Mode or S/370 Mode: In S/370 mode, both Extended Control (EC) and Basic Control (BC) are available. The 4331 Processor operates in either S/370 Mode or in Extended Control Program Support/VSE Mode. The system mode is selectable at Initial Program Load (IPL) time: S/370 Mode allows operation of VM/370, VSE, DOS/VS and DOS. (See "Programming Note" below for details.) ECPS: VSE mode supports operation of an appropriately generated VSE system, with enhanced systems performance.
- Display/Printer Adapter allows attachment of:
  - 3178 Display Station
  - 3180 Model 1 Display Station
  - 3191 Model A1X, B1X, D1X, D3X Display Station
  - 3192 Model C1X, C3X, D1X, D3X, F1X, F3X Display Station
  - 3262 Line Printer Model 1 (650 lpm system printer)
  - 3262 Line Printer Model 11 (325 lpm system printer)
  - 3268 Printer Model 2 and 2C (340 cps)
  - 3289 Line Printer Model 4 (400 lpm system printer)
  - 3278 Display Station Model 2, and keyboards
  - (Canada only > 3270 Personal Computer (Control Unit Terminal Mode only). Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer.<)
  - 3279 Color Display Station Model 2A and keyboards
  - 3278 Display Console Model 2A, keyboard and control panel
  - 3279 Color Display Console Model 2C, keyboard and control panel
  - 3287 Printer Models 1, 2, 1X and 2C
  - 4224 Models 2XX (200/400 cps) (Non-IPDS Mode)
  - 4234 Model 1 Dot Band Printer
  - 4250 Printer
  - Personal Computer XT/370 (5160 Model 589) (Control Unit Terminal Mode only) \*
  - Personal Computer AT/370 (5170 Model 599 and 739) (Control Unit Terminal Mode only) \*
  - 5150 attached to 3278/3279
  - 5150/5160/5170 PC with 3278/3279 Emulation Adapter
  - 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*
  - 5170 with AT/370 Option Kit and 2378/79 Emulation Adapter (Control Unit Terminal Mode only) \*
  - 5210 printer Models G01, G02
  - 6580 Displaywriter System Model A4, A6, A8, A10 (25-line display)
- \* Specify #9843 on 4321 and 4331 must be ordered for attachment of the IBM Personal Computer AT/370 and XT/370.
- The System Diskette Facility is the microcode loading system for the 4331 Processor. The diskettes shipped with the 4331 Processor will supply the required microcode for diagnostics, Standard Functions, and the special features ordered. The System Diskette Facility also allows storage of failure data

from 4331 Processor errors which can subsequently be analyzed by the CE for maintenance purposes.

- Reloadable and Read-Only Control Storage is provided in addition to processor storage. This provides storage space for a portion of system microcode in support of standard functions and special features of the 4331 Processor. The Reloadable Control Storage is not available to the user. 4331 Model Group 11 includes 131,072 bytes of Reloadable Control Storage plus 12,288 bytes of ROS.
- Remote Support Facility (RSF) is an IBM CE tool permitting IBM Field Technical Support Center specialists to remotely monitor and/or perform problem diagnosis on the 4331 Processor. This includes remotely-initiated execution of diagnostic programs, remote examination of all or selected logout records from the System Diskette Facility, and (with proper customer authorization) remote exercise of the Customer Manual Operations.
- Remote Operator Console Facility (ROCF) provides the ability to IML/IPL and execute manual control functions on a remote 4331 via a 3275 (real or emulated) terminal at a host location.

**Other Standard Functions are:**

- Virtual Storage capability by Dynamic Address Translation
- One level addressing facility for improved virtual storage control by VSE (ECPS:VSE mode)
- Channels with virtual storage addressing (ECPS:VSE mode)
- Channel Indirect Data Addressing (in S/370 Mode)
- S/370 Universal Instruction Set
- Extended-Precision Floating Point
- Conditional Swapping
- CE maintenance support functions
- Storage Protection (Store and Fetch)
- Byte-Oriented Operands
- Clock Comparator and CPU timer
- Time-of-Day Clock
- Interval Timer
- PSW Key Handling
- Control Registers
- Machine Check Handling
- Program Event Recording
- Monitoring
- Clear I/O
- Move inverse instruction (not used by IBM programs)
- 4,096 bytes of high-speed storage

**Programming Note:** The ECPS:VSE mode may be invoked at IPL time and supports operation of an appropriately generated VSE Control Program with VSE/Advanced Functions and the SSX/VSE control program.

In S/370 Mode, operation of VSE with VSE/Advanced Functions (generated for use in S/370 Mode), VM/370 Release 6 with or without VM/System Product or VM/BSE Release 2 or VM/SE Release 2 are supported. Although not supported, DOS Release 26 and DOS/VS Release 34 will operate on the 4331 Processor when in S/370 Mode.

**Console Function:** An operator's display, keyboard and control panel is a prerequisite for use of the system by the customer. A 3278 Display Console Model 2A or a 3279 color Display Console Model 2C is required for this purpose. The Operator Control Panel allows additional operator communication with the system. Depending on the mode of console operation, a maximum of 20 of the 25 lines on the display may be used for system communication, four are reserved for messages from the 4331 Processor hardware system, and one displays messages unique to the 3278 Display Console Model 2A or the 3279 Color Display Console Model 2C. The console address is selected at system installation time from the range 009 through 01F.

The console functions in one of two modes: "Display Mode" or the "Printer-Keyboard Mode". In the "Printer-Keyboard Mode", the Display Console uses the keyboard for input and the display and a 3287 Printer Model 1, 2, 1C and 2C or 3268 Model 2 or 2C for or 4234 Model 1 output. The CRT, keyboard and printer appear to the system as a 1052 Printer/Keyboard and operate compatibly with S/360

console operations or as a 3210/3215 Console Printer-Keyboard and operate compatibly with S/370 Console operations. The operation of the 3287 or 3268 Model 2 or 2C in this mode is optional, but recommended. The "Printer-Keyboard Mode" and the 4250 attachment are mutually exclusive.

(Japan only) Printer keyboard mode is not available together with the Katakana language option for the operator console or for 3278 Display or 3287 Printer attached to the Display/Printer Adapter. <)

In "Display Mode" the keyboard is used for input and the CRT with 20 lines by 80 characters/line is used for output. The 3287 Models 1, 2, 1C or 2C or 3268 Model 2 or 2C if attached, has its own address and must be supported by either the 3277 Console Support of DOS/VS Release 34, the 3277 Console Support of VSE, the local-attached 3286/3287 Printer support of VM/370, or the equivalent of any of these.

Another function of the console is the Remote Operator Console Facility (ROCF) which provides the ability to IPL and execute manual control functions on a remote 4331 via a real or emulated 3275 terminal at a host location. ROCF is an extension of Remote Support Facility (RSF).

**ECPS:VM/370:** The 4331 Processor provides ECPS:VM/370 support at Level 19. This support is compatible with VM/370 Release 6 and VM/System Product or VM/BSE Release 2 or VM/SE Release 2 corresponding levels of the System Extension Program Products. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation and Virtual Interval Time. Limitations: May only operate when S/370 Mode has been invoked by IPL.

**Byte Multiplexer Channel (Standard):** Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. The channel permits simultaneous operations of low-speed devices. Operates at up to 36K bytes per second in single byte mode. Up to 500K bytes per second in burst mode. See "IBM 4331 Channel Characteristics", GA33-1550, for devices which may be attached and the data rates achievable for certain configurations. The Byte Multiplexer Channel is always addressed as channel 0. Limitations: Magnetic tape devices may not be attached to the byte MPX channel when 231X devices are attached to the block multiplexer channel.

**Subchannels:** The 4331 Model Group 11 byte Multiplexer Channel provides up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The maximum number of 36 subchannels is reduced by one for the Communications Adapter and one for each telecommunication line on the Communications Adapter.

**Block Multiplexer Channel (Standard):** Provides eight control unit positions. The Block Multiplexer Channel permits simultaneous operation of high-speed devices. Ability to "Block Multiplex" and facility for multiple requesting allows several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels which cannot utilize block multiplexing will function as if attached to selector channels. 33XX devices (and the 3830 or 3880 storage control units) do not attach.

Data rate is up to 1.25 million bytes per second -- see "IBM 4331 Channel Characteristics", GA33-1550, for details. Channel addresses may be selected at installation time from the range of 1 to 6.

**Subchannels:** The following subchannel combinations can be configured at installation time:

- Up to 256 non-shared or shared subchannels each with devices in multiples of 8, up to a total of 256 devices.

**Integrated I/O Adapters:** The following I/O adapters control the designated I/O devices:

- DASD Adapter (Standard)
- 8809 Magnetic Tape Unit Adapter (Standard)
- Display/Printer Adapter (16 Ports, Standard)
- Communications Adapter Base (Standard)
- 5424 Adapter
- Loop Adapter

## MACHINES

**Note:** All data passing through the system for any I/O device interferes with the data flow for other devices, producing I/O limitations. The limitations take two forms:

1. Hardware exclusives listed in the feature descriptions.
2. I/O attachments which individually or in combination can produce frequent overruns. Considerations in this category are:
  - The aggregate data rate on the Block Multiplexer Channel and the DASD Adapter.
  - The number and speed of lines attached to the Communications Adapter.
  - The number and class of overrunable devices on the Byte Multiplexer Channel.

It is necessary to consult the "IBM 4331 Channel Characteristics Manual", GA33-1550, to properly configure a 4331 with an I/O configuration that has not previously been analyzed.

**DASD Adapter (Standard):** One DASD Adapter provides direct attachment of 3310, 3370 A1/A2 and/or 3340/3344 Direct Access Storage Devices without the necessity of a control unit. The 3310 and the 3370 operate in fixed block mode. The 3340/3344 operates in Count-Key-Data (CKD) mode. When using 3340/3344 exclusively system throughput can be degraded by a factor of more than two compared with use of fixed block mode devices. Specify: #9318%z if 3370 Model 2 attaches to the DASD Adapter. DASD CKD Emulation (#7901) is not provided if 3370 A2/B2 is installed.

Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string. The maximum number of strings of each type of device on the DASD Adapter is:

1. Up to four 3310 Model A1s or A2s with 3310 Model B units attached, up to a maximum of 4 drives per string.
2. Up to four 3370 Model A1/B1 with 3370 Model B1/B2 units attached, up to a maximum of 4 devices (8 actuators) per string. Intermix of 3370 Models 1 and 2 on strings and within a string is supported.
3. Up to two 3340 Model A2s with 3340/3344 Model B units attached, up to a maximum of eight drives per string. Attachment of 3340/3344 is limited to two strings on the system.

The String Switch Capability allows sharing of 3340/3344 or 3370 DASD with another IBM processor or control unit that supports the DASD and string switching. String switch support for the 3340/3344 is limited to the static assignment of a shared string to one processor at a time. The 3340-A2 or the 3370-A1/A2 must have the string switch feature #8150 installed.

With a direct-attached 3340 the DASD Adapter can read data from a 3348 Data Module which was recorded on a 3340 attached to a S/3 Model 12 or 15. This function is available as a conversion aid for users converting to the 4331 Processors from a S/3.

3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	01	02	03	04	05	06	07
		2A	2B	2C	2D	2E	2F
		4A	4B	4C	4D	4E	4F
		6A	6B	6C	6D	6E	6F

and

X10	11	12	13	14	15	16	17
		3A	3B	3C	3D	3E	3F
		5A	5B	5C	5D	5E	5F
		7A	7B	7C	7D	7E	7F

Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. The channel address may be from 1 to 6.

**Display/Printer Adapter (Standard):** This adapter allows for attachment of the prerequisite 3278 Display Console Model 2A or a 3279 Color Display Console Model 2C and up to 15 additional devices chosen from the list below:

- 3178 Display Station
- 3180 Display Station Model 1 \*
- 3191 Model A1X, B1X, D1X, D3X Display Station
- 3192 Model C1X, C3X, D1X, D3X, F1X, F3X Display Station
- 3262 Line Printer Model 1 and 11 (650 and 325 lpm)
- 3268 Printer Model 2 and 2C (340 cps)
- 3278 Display Station Model 2
- (Canada only) > 3270 Personal Computer (Control Unit Terminal Mode only). Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer. <)
- 3279 Color Display Station Model 2A
- 3287 Printer Models 1, 2, 1C and 2C (80 and 120 cps)
- 3289 Printer Model 4 (400 lpm)
- 4224 Models 2XX (200/400 cps) (Non-IPDS Mode)
- 4234 Model 1 Dot Band Printer (300 lpm)
- 4250 Printer
- Personal Computer XT/370 (5160 Model 589) (Control Unit Terminal Mode only) \*\*
- Personal Computer AT/370 (5170 Model 599 and 739) (Control Unit Terminal Mode only) \*\*
- 5150 attached to 3278/3279
- 5150/5160/5170 PC with 3278/3279 Emulation Adapter
- 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode)
- 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode)
- 5210 printer Models G01, G02
- 6580 Displaywriter System Model A4, A6, A8, A10 (25-line display)

\* The 3180 Model 1 is supported only when it is emulating a 3278 Model 2. The 3180 extended functions or larger screen formats are not supported.

\*\* Specify #9843 on 4321 and 4331 must be ordered for attachment of the IBM Personal Computer XT/370 and AT/370.

These machines may be installed in any combination, provided that (1) only 15 devices are installed and (2) no more than two System Printers (3262 and/or 3289) are included. Due to the processing power requirements, it is not practical to attach more than four 4250 printers. The 6580 Displaywriter System can connect to 1 or 2 device ports (display station, or display station and printer).

The file transfer function from Personal Computer to host and the screen capture function to the PC printer or diskette are not supported on the Personal Computer attached to the 3278/3279 if connected to the Display Printer Adapter.

The 3262 or the 3289 Line Printer may be used as system printers dependent upon control program or program product support. One 3287 or 4234 Model 1 or 4224 Printer may be used as a console hardcopy device; one or more 3287 or 4224 or 4234 Model 1 Printers may be used as hardcopy workstation devices; one or more 5210 may be used as high quality printer in 3287 mode only. The 3178 Display Station, 3180 Model 1 Display Station, 3278 Display Station Model 2, (Canada only) > 3270 Personal Computer (Control Unit Terminal Mode only)\*\*,<) or 3279 Color Display Station Model 2A may be used as workstations for user-written applications.

The 6580 Displaywriter System emulates a 3278 Model 2 Display Station, and, optionally, a 3278 Model 1, 2 Printer. The 6580 may be used as a workstation for user-written applications and for hard copy, as a 3278 Model 2 and 3287 Model 1, 2. Display/Printer Adapter support includes all standard functions of the 3274 Model X1B with the 3178, 3180 Model 1, 3278 Model 2, (Canada only) > or 3270 Personal Computer (Control Unit Terminal Mode only)\*\*,<) or 3279 Model 2A or 5150/5160 PC with 3278/3279 Emulation Adapter attached. In addition, the following 3180 Model 1, 3278 Model 2 or 3279 Model 2A special features are supported: Keyboard Numeric Lock (standard on the 3178 or 3180 Model 1), Audible Alarm (standard on the 3178, 3180 Model 1 or 3279), Security Keylock (standard on the 3178 or 3180 Model 1) and Switched Control Unit (Switch control unit as an accessory on the 3180 Model 1). Other 3278 Model 2 or 3279 Model 2A special features are not supported. When used as workstations, 3278 or 3279 Display Station keyboard feature codes #4621, #4622, #4623, #4627, , #2715, #2716, #2717, or 3178 Model C1 or C2, or 3180 Model 11X, 12X, or 13X may be selected. If two different keyboards are required for a workstation, one must be

#4621(Japan only > or #2715 <). Addresses for these devices are selected at installation time from the range 009 through 01F. Specify #9843 must be ordered for attachment of 5150/5160 PC with 3278/3279 Emulation Adapter.

(Canada only > \*\* Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer. <)

The 6580 Displaywriter System prerequisites for attachment include the 3270 Attached Work Station licensed program (5608-SR9) and the 3274/3276 Attached Workstation adapter (#8332) and specify #9842 in the 4331 must be ordered for attachment of Displaywriter.

Two language/keyboard combinations may be installed on the Display/Printer Adapter. Language(s) supported and keyboard(s) to be attached must be specified at order entry-time or via MES -- see "Specify" below.

(Except Canada > If a Katakana operator console is installed, the 3278 Model 2 or 3279 Model 2A Display Stations with Katakana installed on the Display/Printer Adapter must have typewriter keyboard #2715 or #2717. <)

**Diskette Drive (Optional):** A single drive diskette reader/recorder providing the ability to read or write Diskettes Type I on the 4331 Processor. This diskette has a data capacity of 242,944 bytes organized in 1,898 sectors of 128 bytes each (for use in exchanging data with the several products listed below). The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output Unit. When used with VSE, refer to VSE/POWER documentation. Data recorded on a Diskette Type I can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5230 and 8100 and S/1 and S/3, 32, 34, and 38. One diskette is shipped with the feature. Additional diskettes are available from IBM National Distribution Division (NDD). Device address is selected at installation time from the range 009 through 01F. Limitation: Support by VM/370 via IUP only.

**8809 Magnetic Tape Unit Adapter (Standard):** Provides direct attachment of 8809 Model 1A and up to five additional 8809 tape units (consisting of a mix of 8809 Model 2s and 3s) -- allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for loading or off-loading DASD devices or in start/stop mode (data rates is up to 20K bytes per second) for other data processing operations. Although physical Read-Backward commands are not supported, the Read-Backward operation is simulated in the Logical IOCS (MTMOD) of VSE. Channel and device addresses may be assigned at system installation time from the range of X00 to X7F, where X is 1 to 6.

**5424 Adapter (Optional):** Provides native attachment of 5424 Multi Function Card Unit Models A1 or A2 (Japan only > (Models K1, K2, K3) <) for 96-column card operations, device address is 04C.

**Loop Adapter (Optional):** The Loop Adapter on the 4331 is a native attachment method for the 3640 Plant Data Communications Terminals -- 3104 Display Terminals Models B1, B2 -- 8775 Display Terminal Models 1 and 2 -- 3232 Keyboard Printer -- 3287 Printer -- 3274 Control Unit Model 51C, 61C, 52C -- 3276 Control Unit Display Station with their associated terminals. Communications is based on SDLC loop protocols. The Loop Adapter provides the user with a native interface to these terminals and increased configuration flexibility.

A maximum of two direct-attached loops and two data link adapters are supported. Each of the direct-attached loops consists of two lobes (loop cables), for a total of four lobes on the system. Both lobes must operate at the same bit rate. Each lobe is functionally a loop however, all data on one lobe passes serially through the second lobe and can be as long as the loop, and a fault in one lobe will not affect the terminals on the second lobe, when the disrupted lobe is bypassed at the system. Therefore lobes can cover a greater distance and improve availability.

Each of the data link adapters can attach one IBM 3843 Loop Control Unit as point-to-point or up to four Loop Control Units as multipoint configuration. Details on programming information are provided in the "IBM 4331 Loop Adapter Programming Guide", SC31-0500-0.

User-written programs for loop-attached terminals reside in the 4331 Processor storage and are controlled by VSE and ACF/VTAME

or ACF/VTAM and CICS/DOS/VS. The 3644 Automatic Data Unit and 8775 Display Terminal with Downstream Loadable Functions are supported by ACF/VTAME and DSLU with VSE. In order to personalize the 3644, the GEN3644 program product is required in addition to DSLU.

In addition IBM offers a PRPQ to CICS/VS announced December 23, 1980. This PRPQ Loop Adapter CICS/VS Extension for 3640 terminals is a series of programs and exit routines that enhance the support of the 3641, 3642, 3644, 3646 and 3647 when attached to the 4331 Processor by Loop Adapter Feature. The following four functions are addressed by this PRPQ:

1. Terminal initialization
2. Terminal re-initialization
3. 3642 encode check handling
4. Transaction selection

Communications network management problem determination support for 4331 loop-attached 3104 Display Terminals, 8775 Display Terminals, 3232 Keyboard Printer Model 11, 3276 Display Control Stations and 3274 Model 51C., 52C 61C Display Controllers and their/associated terminals, is provided via NCCF/NPDA.

The following terminals/controllers are supported: 3641 Reporting Terminal Models 1, 2 -- 3642 Encoder Printer Models 1, 2 -- 3643 Keyboard Display Model 2, 3, 4 including #4920 Badge and Document Encoder -- 3644 Automatic Data Unit -- 3645 Printer -- 3646 Scanner Control Unit -- 3647 Time and Attendance Terminal -- 3104 Display Terminal Models B1, B2 -- 8775 Display Terminal Models 1, 2 -- 3232 Keyboard Printer Model 11 -- 3287 Printer Models 11, 12 -- 3274 Control Unit Model 51C, 52C, 61C -- 3276 Control Unit Display Station Models 11-14 with their associated terminals -- 3843 Loop Control Unit. Device addresses are 040 through 07E.

**Communications Adapter Base (Standard):** The 4331 Communications Adapter can serve up to eight communication lines. Synchronous Data Link Control (SDLC), Binary Synchronous Communications (BSC) and Start/Stop (asynchronous) transmission modes are provided (Start/Stop and BSC operate in 2703 compatibility mode). The Communications Adapter can handle a variety of terminals (Data Terminal Equipments, DTEs), at different speeds.

The Communications Adapter has the following overall structure: The Communications Adapter Base contains common circuits and control. Each of the up to eight telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment feature. Another feature serves for autocal unit interface and two may be installed.

The interface with the external communication facilities is through a modem (also called signal converter or Data Circuit Terminating Equipment). It may be a stand-alone unit or a 1200 bps integrated modem. For Communications Adapter Base details, see section "Communications and Loops" below.

## IBM Stand-Alone Modems

Switched	
3976 Model 2	up to 300 bps
3976 Model 3	600/1200 bps
(Canada only >	
3863	2400 bps
3864	4800 bps
3872	1200/2400 bps
3874	2400/4800 bps <)

Nonswitched	
3976 Model 1	up to 200 bps
3976 Model 3	600/1200 bps

(Canada only > The following modems, except the 3868, are supported with the Switched Network Backup feature -- see M3863, 3864, 3865, 3872, 3874, 3875 pages for details: <)

3863	2400 bps
3868 Model 1	2400 bps
3864	4800 bps
3868 Model 2	4800 bps

## MACHINES

3865	9600 bps
3868 Model 3/4	9600 bps
3872	1200/2400 bps
3874	2400/4800 bps
3875	3600/7200 bps

**IBM Integrated Modem (V.23, 1200 bps):** The following integrated modem configurations are available:

- Switched network with auto answer
- Nonswitched line, 2- or 4-wire
- (Canada only) Nonswitched line with switched network backup and auto answer.
- Nonswitched line with switched network backup with manual answer. (<)

**OEM Modems:** OEM modems that comply with EIA RS-232-C, CCITT V.24/V.28, or CCITT V.35 recommendations may be connected to the Communications Adapter. Attachment is under the provisions of the Multiple Supplier Systems Policy.

**PTT-Mandatory Modems:** The Communications Adapter will support the mandatory modems which the PTTs in various WT countries provide for attaching Data Terminal Equipment (DTE), such as the Communications Adapter, to their facilities. See M2700 pages

**X.21 Adapter for Nonswitched Networks:** The X.21 interface allows attachment to the X.21 facilities available in certain countries by way of an internal X.21 adapter.

**Automatic Calling Equipment:** The following Automatic Calling Equipment, maximum two, can be attached to the Communications Adapter:

- The Communications Adapter will support mandatory autocal Units which the PTTs in various WT countries provide in accordance with CCITT V.25. See Autocall Unit Interface (#1020) for specifics.
- Other Automatic Calling Equipment which complies with EIA RS-366 or CCITT V.25 may be connected to the Autocall Unit Interface (#1020) under the provisions of the IBM Multiple Supplier Systems Bulletin.

## SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture.

- Power (1-phase, 3-wire, 60 Hz): #9902 for 208V, #9914 for 240V, #2732 for 200V, 2803 for 220V.  
(1-phase, 3-wire, 50 Hz): #2813 for 220V, #2801 for 240V, #2806 for 200V, #2821 for 230V. (Meets Japanese Current Leakage Requirements.)
- Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray.
- Machine Nomenclature: National safety regulations require maintenance labels in local language. The language is determined by default from the three digit country code in the machine order. If the installation country is different from the order country, specify #2900 which provides sets of labels in other languages. The IBM CE selects and installs the appropriate one. (Canada only) In Quebec: Specify #2935 for Canadian French #2934 for English. (<)
- Specify #9841 in 4331 must be ordered for attachment of 3268 or 4234 Model 1 to 4331. Provides microcode and/or maintenance documentation if machine is below EC 366586 (microcode for 4331) and/or below EC 366584 (maintenance document) for all Models.
- Specify #9843 must be ordered for attachment to 5150/5160 PC with 3278/3279 Emulation Adapter.

- 4250 Printer Attachment: Specify (#9260) for 4250 Printer attachment to display adapter.
- 6580 Displaywriter System Attachment: Specify (#9842) for 6580 attachment to the Display/Printer Adapter.
- Remote Support Facility: The Remote Support Facility (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4331 Processor. It provides service personnel the capability of remotely controlling the 4331 from any RETAIN terminal and allows the CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network. For details on ordering and customer responsibilities, see Systems and Procedure Manual.

(Australia and Brazil only) When specified, each 4331 Processor will be equipped with either a CCITT interface or 1200 bps Integrated Modem (switched network, manual answering) for RSF.

Specify #2838 for CCITT interface.

Specify #2836 for 1200 bps Integrated Modem, switched network, manual answer. (<)

- (Canada only) Specify #9510 for Remote Support Facility via a 1200 bps integrated modem, switched network, manual answer. (<)
- (Japan only) Each 4331 Processor will be equipped with either a CCITT interface or 1200 bps Integrated Modem, non-switched:

Specify #2838 for acoustic coupler interface.

Specify #2944 for 1200 bps Integrated Modem, non-switched. Also specify #2943 for the NTTCA-2 modem service cable connector. (<)

All other countries, consult your country's DPCE department.

- Remote Operator Console Facility (ROCF): This feature is an extension of RSF. It provides to an operator at a host location the ability to IML, IPL and execute other 4331 manual control functions for a remote 4331 via a real\* or emulated 3275 terminal (Remote Console). After IML and IPL is complete the Remote Operator console should be disconnected and the remote 4331 should be operated in stand-alone mode or control should be turned over to existing networking facilities. ROCF is not designed to be used for interactive applications because operation of all devices attached to the Display/Printer Adapter of the 4331 are suppressed when ROCF is in use. Field Installation: Yes.

\* 3275 Model 2 can only be obtained on an "as available" basis.

(Except Canada and Hong Kong) Specify ROCF feature #2838 for CCITT V.23/V.24/V.28 Interface. The requisite customer-supplied or PTT-mandatory non-clocked external modem attached to feature #2838 must include auto answer. Line discipline is BSC, 600 or 1200 bps. Note: Katakana is not supported for 3275 Model 2 as the remote console. Katakana is supported only by the VM/Pass-Through Facility Program Product. (<)

(Canada only) Specify ROCF feature #9511 for EIA-Interface. The requisite customer-supplied non-clocked WE 202S equivalent external modem attached to feature #9511 must include auto answer. Line discipline is BSC, 600 or 1200 bps. (<)

(Hong Kong only) Specify #2838 for CCITT V.23/V.24/V.28 Interface and #2839. The requisite customer-supplied or PTT-mandatory non-clocked external modem must include auto answer. Line discipline is BSC, 600 or 1200 bps. (<)

- Loop-Attached Terminals: The following specify codes must be selected one time when 3640 and/or 8775 and/or 3287 Terminals and/or 3274-51C, 52C, 61C, and/or 3276 Control Units

are attached to the system via Loop Adapter 1 and/or 2 (#4830, #4831) and/or Data Link Adapters (#4840).

- #9251 3641 Reporting Terminal/3647 Time and Attendance Terminal
- #9252 3642 Encoder Printer
- #9253 3643 Keyboard Display
- #9254 3644 Automatic Data Unit (ADU)
- #9256 3646 Scanner Control Unit
- #9257 8775 Display Terminal 3287/3645 Printer, 3274-51C, 52C, 61C and 3276 Control Unit, and 3104 Display Terminal
- #9258 3643 Keyboard Display with #4920

- Keyboard/Character Set Language: Must be specified on the 4331 for 3178, 3180, 3191, 3192, 3278, 3279, 3287 devices attached to the Display/Printer Adapter and for 3641, 3642, 3643 devices attached to the Loop/Data Link Adapter. It must correspond to the Keyboard/Character Set Language ordered for the device.

1. Specify language from Table 1 Column A. This language is mandatory for the 3278 Model 2A or the 3279 Model 2C; and can be used for 3178 model C2; 3180 model 1; 3191 model A1X, B1X; 3192 model C1X, D1X, 3278 model 2; or 3279 model 02X, with typewriter keyboards and 3287 printers.
2. For attachment of 3178 Model C1 or 3180 Model 1 or 3278 Model 2 with Data Entry Keyboards, select one language from Table 2 column B and specify one of the mutually exclusive keyboard types. #9301 for Data Entry (3178 Model C1 #4622, 3178 Model C1 #2716 or 3180 Model 1 #4601), or #9302 for Data Entry, keypunch-layout (#4623). Note: 3178 Model C1K cannot be used and Data Entry Keyboard cannot be specified for 3180 Model 1, 3278 Model 2 or 3279 Model 02X display workstations if Katakana is to be used on both the operator console and the workstations.
3. If alternate language for 3178 Model C2, 3180 Model 1, 3278 Model 2 or 3279 Model 02X with typewriter keyboard is required, specify language from Table 1 Column B and keyboard type as follows: #9303 for typewriter keyboard 3178 Model C2, 3180 Model 1 with #4600, #4621, #4627, #2715, #2717. Note: 3178 Model C1, 3180 Model 1, 3278 Model 2 or 3279 Model 02X with Data Entry Keyboard cannot be attached in this case.
4. For 3641/3642/3643 devices English US #2956 is automatically supplied. In addition, one alternate language can be selected from Table 1, column B. It must correspond to the alternate language which may have been specified for 3178/3180/3278/3279/3287 devices. As an exception, #2930 US Keyboard/Katakana Display, not available for 3278/3279, may be specified for 3643 in addition to the alternate language for 3178/3180/3278/3279/3287.

Table 1 - 4331 Keyboard Language/Character Set Language

	A Mandatory	B Alternate Language and/or Keyboard Type
International*	#0950	#2950
US	#0956	#2956 (1)
EBCDIC*	#0951	#2951
Brazil	#0975	#2975
Canadian French	#0956 (4)	#2977
Japanese Eng.*	#0955	#2955
Katakana	#0973 (3)	#2973
Spain*	----	#2960 (5)

Span Speaking #0969 #2969 (2)  
US Keyboard ---- #2930 (6)

\* Not available on 3180.

Notes:

1. Automatically supplied for 3641/3642/3643 devices.
2. Not available for 3642. Spain #2960 will be supplied.
3. For Japan only. For Katakana, specify #0973 on 4331, and #2720 and #2773 on the 3278 Model 2A or the 3279 Model 2C.
4. For Canadian French, specify on the 4331 US #0956. For the 3278 Model 2A or 3279 Model 2C, Canadian French Keyboard Language (#2977) must be specified.
5. Not available for 3278/3279/3287 and 3641/3643 devices. This character set is used for 3642 when Spanish Speaking is specified.
6. Only available for 3643.

(Canada only) Specify #9843 on 4331 must be ordered for attachment of the 3270 Personal Computer. <)

- For 3641/3642/3643 devices, English US #2956 is automatically supplied.
- Console Table: A console table is available -- see #1550 or M4331-1 "Accessories" section. Book Rack and Cable Holder -- see #1480 or M4331-1 "Accessories" section.
- See 3278 Display Console Model 2A or 3279 Color Display Console Model 2C for console cabling.

SPECIAL FEATURES

Legend:

%x: Feature supplies diskette for System Diskette facility.

%z: System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette.

**Adapter Power Prerequisite (#1001):** Provides power and control circuitry necessary for the Communications Adapter (when more than three line features are attached), and the Adapter Logic. Maximum: One. Field Installation: Yes. Prerequisites: #1002 or for the Loop Adapter (#4830) and/or Communications Adapter Base with more than three line attachments #4695 and/or #4696.

**Adapter Logic Prerequisite (#1002):** Provides logic and control function necessary for the 5424 Adapter (#3901). Maximum: One. Field Installation: Yes. Prerequisites: #1001.

**Microcode Storage Requirements:** The System microcode resides in the Reloadable Control Storage and Processor Storage, and is loaded from the standard System Diskette facility at IML-time. None of the Reloadable Control Storage is available for user programming and the systems configuration selected will determine the Processor Storage available for user programming and operating system residence.

To calculate the amount of Processor Storage which is available for customer purposes and operating system residence, use the following procedure. Note: An interactive HONE aid (ANCHLOAD) is available dependent on the control program or program product device support to facilitate this procedure.

1. Consulting Table 2, determine the microcode groups required to support the features and I/O to be installed.
2. On Table 3, place a check mark in the appropriate rows.
3. Find the sum of Table 3 for the required microcode groups.
4. Subtract the control storage of 143,360 bytes from the total of Table 3 and round up to the next multiple of 4,096.

The result of step 4 determines the amount of processor storage occupied by microcode and should be subtracted from the processor storage size ordered to determine the amount available

for the user. The storage for group 3 specified in Table 2 (DAS Compatibility #7901) is only occupied if the feature is activated at IPL time.

Table 2 - Microcode Groups

Function/Feature Installed	Micro-code Group
4331 Model Group 11 Processor	1
Direct Access Storage Compatibility (#7901)	2
BSC lines installed (#9671-#9678)	3
S/S lines installed (#9681-#9688)	4
SDLC lines installed (#9691-#9698)	5

Note: The Microcode Group 1 contains 4331 Model Group 11 standard hardware features, see M4331-11 section.

Table 3 - Storage Per Microcode Group

Micro-code Grp	Control Storage -or- Proc. Storage	Notes
1	331776 8800 1800	Plus Per 3340 buffer. For a 2nd string of 3340s attached to the DASD adapter.
2	28948 0 7680 13312 8704	Plus Per 2311 buffer. Per 2314 buffer. Per 3330 buffer. Per 3340 buffer.
3	6144	
4	5120	
5	10240	

**Diskette Drive (#3401):** A single drive diskette reader/recorder providing the ability to read or write IBM Diskettes Type 1. The Diskette Drive is supported by the control program as a 3540 Diskette Input/Output unit. Limitations: Not supported by VM/370. Maximum: One. Field Installation: Yes.

**External Signals (#3898):** Provides six distinct external interrupt lines to request and identify an external interrupt response from the processing unit. Maximum: One. Cable Order: Required. Field Installation: Yes. Prerequisites: External Devices must meet the interface specifications outlined in "S/360 Direct Control Feature OEMI", GA22-6845.

**5424 Adapter (#3901%*x*):** Allows attachment of one 5424 Multi-Function Card Unit Model A1 or A2. (Japan only) Also allows attachment of one 5424 Model K1, K2 and K3. Limitations: The 5424 is supported by DOS/VSE only. The 5424 must be physically attached, otherwise the system is inoperative. Cannot be installed

with the Loop Adapter (#4830). Maximum: One. Field Installation: Yes. Prerequisites: #1001 and #1002.

**Power Interface, Add'l (#5532):** Provides power control to the 4331 Processor for control units attaching to the 4331 Byte Multiplexer Channel and Block Multiplexer Channel. Table 4 below lists the control units/devices for which this feature must be installed in the 4331 Processor. Standard Power Interface allows attachment of up to eight of these control units; Power Interface, Add'l (#5532) allows attachment of eight additional control units for a maximum of 16 per processor. Maximum: One. Field Installation: Yes.

Table 4 - Control Units/Devices Requiring Power Interface Features

**Mandatory:**

1255 Magnetic Character Reader  
1270 Optical Reader Sorter  
1275 Optical Reader Sorter  
1287 Optical Reader  
1288 Optical Reader  
1419 Magnetic Character Reader  
1442 Card Read Punch Model N1  
1442 Card Punch Model N2  
1443 Printer Model N1  
2314 Storage Control\* Model A1 and B1  
2314 Direct Access Storage Facility\* Model 1  
2415 Magnetic Tape Unit and Control  
2501 Card Reader Model B1 and B2  
2520 Card Read Punch Model B1, B2 and B3  
2701 Data Adapter Unit  
2702 Transmission Control\*  
2703 Transmission Control\*  
2803 Tape Control  
2821 Control Unit Models 1, 2, 3, 5 and 6  
2822 Paper Tape Reader Control\*  
2840 Display Control\*  
2841 Storage Control  
3272 Control Unit  
3411 Magnetic Tape Unit and Control  
3505 Card Reader  
3540 Diskette Input/Output Unit  
3704 Communications Controller  
3705 Communications Controller  
3791 Controller  
3800 Printing Subsystem  
3803 Tape Control  
3811 Printer Control Unit  
3881 Optical Mark Reader Model 1  
3886 Optical Character Reader Model 1  
3890 Document Processor  
3895 Document Reader/Inscriber

\* No longer available

**Not Mandatory, but can utilize Power Interface features:**

3274 Control Unit  
3340 Direct Access Storage Facility  
3370 Direct Access Storage  
3203 Printer Model 5

**Direct Access Storage Compatibility (#7901%*z*):** Designed to be used primarily as a conversion aid, this feature provides emulation of 2311/2314 data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100Mb/volume) or 3340 data formats on 3370 Direct Access Storage. This allows programs written for use of 2311/2314, 3330 or 3340/3344 DASD to be executed with only Job Control modifications using the 3310 or 3370 Direct Access Storage.

DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. The DAS Compatibility feature includes all of the compatibility types available for 3310 and 3370. Any one type can be activated at IPL time. Operates in S/370 Mode under DOS, DOS/VS, or VM/370, in ECPS/VSE Mode under DOS/VSE. Under DOS/VSE, data sets in fixed block format and in emulated format can co-reside on the same 3310/3370 volume. With DOS/VSE a variable number of full or partial CKD volumes can be stored the 3310 or 3370

up to the capacity of the host device. Each emulated volume regardless of whether stored with full or partial capacity, begins on a predefined full-volume boundary. With VM/370 partial emulated volumes are not supported.

Mapping of emulated volumes onto 3310/3370 volumes is as follows:

**Maximum Number of Emulated Full Volumes:**

Compat.  
Type

	Per Host Volume	Per String	Per System
2311 on 3310	7	28	56
2314 on 3310	2	8	16
2311 on 3370	34	68	68
2314 on 3370	9	63	63
3330 on 3370	2	16	28
3340 on 3370	3	24	42

For device address assignment refer to "IBM 4331 Compatibility Features", GA33-1528.

**Performance Note:** Use of DAS Compatibility introduces additional processor and channel demands and can have a significant effect on system performance, particularly in environments with high I/O load using emulated DASD. Batch job execution elapsed times may increase by a factor of more than two. The results of measurements on a typical commercial jobstream show an increase in elapsed time by a factor of 1.7, compared to execution with the 3370 in fixed block mode. The performance impact is less severe when DASD is used in mixed fixed block and emulation mode, which is possible in operation with DOS/VSE or VM/370. Also less critical are online workloads with generally lighter I/O loads. Exclusive use of DASD emulation for batch operation is not recommended in any SCP environment.

**Limitations:** (1) Operates on up to two strings of 3310 or 3370 attached to the DASD adapter. (2) Operation of emulation and direct-attached 3340/3344 is limited to two strings on the system. (3) One type of emulation can be activated at IPL time. (4) 3330 Model 11 cannot be emulated. (5) Emulation cannot be used on 3370 drives which are shared via a string switch. (6) VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370. (7) DASD CKD is not provided if 3370 A2/B2 is installed.

**Program Order:** The required utility programs 3310 for initialization and surface analysis of the 3370 DASD as well as the formatting of the emulator extent are included in the DOS/VSE SCP, (5745-030) or combined with VSE/Advanced Functions, and VM/370 (5749-010) contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device Support Facilities are also separately orderable with program order number 5747-DS1. Maximum: One. Field Installation: Yes. See Tables 2 and 3 for microcode storage requirements.

## COMMUNICATIONS AND LOOPS

**Communications Adapter Base (Standard):** Provides the basic control and common circuits for the direct attachment of up to eight synchronous (BSC), asynchronous (Start/Stop) or Synchronous Data Link Control (SDLC) communication lines in any combination, provided that the aggregate data rate capability of up to 64,000 bps is not exceeded. For data rates achievable, see GA33-1535. The maximum speed of each of the eight lines is 9600 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 64,000 bps and may operate concurrently with other lines provided the data rate limitation is not exceeded. SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, native or as a guest under VM/370.

Base Characteristics are:

- Auto Answer
- Autopoll operation
- Multipoint central station functions
- Multipoint tributary station functions for BSC only
- EBCDIC transparent mode for BSC only
- EBCDIC and ASCII code for BSC only

The Communications Adapter attaches up to eight lines via the following optional features:

- Up to eight line features without business clock for attachment to X.21 Nonswitched Data Network.
- Up to 8 line features without internal clock for attachment to external modems (Data Circuit Terminating Equipment, DCE) with clock.
- Up to 8 line features with internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) without clock.
- Up to 1 synchronous high-speed line feature.
- Up to 8 line features with integrated modems.
- Up to 8 line features with local attachments.
- Autocall Unit interfaces for up to two of the installed lines.

From the Operator's Console-Keyboard the user may specify some configuration parameters for each separate telecommunications line for each individual connection:

- Select stand-by.
- Half-speed operation for synchronous lines only (for both clocked and non-clocked modems which have this capability).
- NRZI mode in SDLC mode.
- Write interrupt (S/S only).
- Read interrupt (S/S only).
- Unit exception suppression (S/S only).
- Error index byte mode (BSC only).
- ASCII code instead of EBCDIC (BSC only).
- Tributary station addresses (BSC only).

Other configuration parameters can be selected at installation time and set by the CE:

- Duplex instead of half-duplex connection (two-way alternate data flow transmission).
- Switched network facility instead of nonswitched lines (for external modems).
- New sync (for BSC or SDLC in multipoint primary station function only).
- High-speed operation for one line (BSC or SDLC only).
- Connect Data Set to Line or Data Terminal Ready procedure.
- Selection of WE 202 or V.23 answer tone frequencies for 1200 bps integrated modems with automatic answering.

**Limitations:** (1) SDLC is supported only by ACF/VTAME operating under DOS/VSE or SSX/VSE, or ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. (2) Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "System Subchannels" above for details. (3) The aggregate data rate of lines in operation on the Communications Adapter is 64,000 bps. With the exception of a synchronous line installed in position one capable of higher speed, the line speed is limited to 9600 bps. For data rate and attachment limitations for other devices and communications lines, refer to "IBM 4331 Processor Channel Characteristics", GA33-1535, which contains tables of pre-analyzed configurations. Prerequisites: #1001 is required when more than three telecommunications line features are attached. See Table 2 for microcode storage requirements.

**Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communications facilities and services.

**Communication Facilities:** See M2700 pages for communications facility requirements with this feature.

**Terminals Supported:** For supported terminals refer to tables in the communications adapter feature description of 4331 pages for Model Group 1 and 2 or for more details to the M2700 pages.

**Autocall Unit Interface (#1020%):** Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the

switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 procedures may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. Limitations: Does not operate with High-Speed Modem Adapter (#4720), any features with 1200 bps Integrated Modem or with any nonswitched lines. Maximum: Two. Cable Order: Required, for attachment to external equipment. Field Installation: Yes. Prerequisites: #3701 (in switched operation) for each Autocall Unit Interface installed. #2835 is required to permit attachment to PTT-supplied Automatic Calling Units in certain countries. Specify: Line position, see Table 5 below. (Except Canada and Japan > 1200 bps Integrated Modem, Switched With Auto Answer (#2831%): <) (Except Canada and Japan > This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Connection to the switched network is made via an integrated Public Switched Feature (WT Line Plate). Maximum: Three. <) Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5 for Line Position Code and Transmission Mode Codes.

(Except Canada > 1200 bps Integrated Modem, Nonswitched (#2832%): <) (Except Canada > This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2-or 4-wire operation is made at installation time. Cable Orders: Required for attachment to external equipment. Maximum: Eight. Field Installation: Yes. Prerequisites: #4696. Specify: SDLC and/or BSC and/or Start/Stop operation are possible. <) (Japan only > One specify code #2943 is required for each #2832 which attaches to NTT D-1 services. If two feature #2832s attach to NTT D-1 services, then two #2943s must be specified. This provides NTT Quick Disconnect and network wrap capability. (Start/Stop communications are not supported with NTT D-1 services.) <)

**Communication Line Isolation (#2835):** Provides an isolation barrier between the modems or Automatic Calling Units and the Communications Adapter, as required by certain WT Countries. Up to ten isolation barriers are available and may be used for one Remote Support Facility (#2833), up to two Autocall Unit Interfaces (#1020), up to eight EIA/CCITT Interfaces (#3701) up to two Data Link Adapters (#4840). Maximum: One. Cable Order: Required for each isolation barrier (up to 10). Field Installation: Yes. Prerequisites: Must be associated with at least one #2833, #1020 or #3701.

**EIA/CCITT Interface (#3701%):** This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line.

When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC or SDLC line is supported. Nonswitched lines with switched network backup may be used where maximum line speed on nonswitched lines is 9600 bps, the maximum line speed on switched network backup or switched networks is 4800 bps.

When this feature is installed in conjunction with Line Attachment Base for Non-Clocked Modems (#4696), then a BSC, Start/Stop or SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. Maximum: Eight. Cable Order: Required, for attachment to external equipment. Field Installation: Yes. Prerequisites: One #4695 or #4696 is required for each feature #3701 installed. #2835 is required to permit attachment to PTT communications facilities in certain countries. Specify: Start/Stop, SDLC and/or BSC operations are possible. See Table 5 for Line Position Code and Transmission Mode Codes.

**Loop Adapter:** Provides the capability to attach directly or via a data link the 3640 Plant Data Communication Terminals and/or General

Purpose Terminals 3104 Models B1, B2 and 8775 Models 1, 2, 3232 Keyboard Printer Model 11 and 3287 Models 11, 12 and/or Control Units 3274 Model 51C, 52C, 61C and 3276 Models 11-14 with the associated terminals to the 4331 Processors. Loop Adapter 1 and 2 (#4830, #4831) provide for direct attachment. A maximum of two Data Link Adapters (#4840) provide for remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter (#4840) can be used as point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

Devices that can be attached to direct-attached loops at 9600 bps or data link-attached loops at 2400, 4800 or 9600 bps are the following:

#### Device Attachments:

- 3104 Display Terminal Models B1, B2
- 3232 Keyboard Printer Model 11
- 3641 Reporting Terminal Models 1, 2
- 3642 Encoder Printer Models 1, 2
- 3643 Keyboard Display Models 2, 3, 4 including #4920 Badge and Document Encoder
- 3644 Automatic Data Unit
- 3645 Printer
- 3646 Scanner Control Unit
- 3647 Time and Attendance Terminal
- 8775 Display Terminal Models 1, 2
- 3287 Printer Models 11, 12
- 3274 Control Unit Model 51C, 52C, 61C with the associated terminals
- 3276 Control Unit Display Station Model 11-14 with the associated terminals

#### Control Units and Associated Terminals:

- 3274 Control Unit Model 51C, 61C
  - 3178 Display Station
  - 3179 Model 1 Color Display Station
  - 3179 Model G1, G2 Color Graphics Display Station
  - 3180 Display Station Model 1
  - 3191 Model A1X, B1X D1X, D3X Display Station
  - 3192 Model C1X, C3X, D1X, D3X, F1X, F3X Display Station
  - 3278 Display Station
  - (Canada only > 3270 Personal Computer - Control Unit Terminal Mode only. Specify #9843 on 4321 and 4331 must be ordered for attachment of the 3270 Personal Computer. <)
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3268 Printer Model 2
  - 3287 Printer
  - 3289 Line Printer
  - Personal Computer XT/370 (5160 Model 589) (Control Unit Terminal Mode only) \*
  - Personal Computer AT/370 (5170 Model 599 and 739) (Control Unit Terminal Mode only) \*
  - 4234 Model 1 Dot Band Printer
  - 5150/5160/5170 PC with 3278/3279 Emulation Adapter
  - 5160 with XT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*
  - 5170 with AT/370 Option Kit and 3278/79 Emulation Adapter (Control Unit Terminal Mode only) \*
  - 5210 printer Models G01, G02
- 6580 Displaywriter System, Model A4, A6, A8, A10 (25-line display)
- 6580 Displaywriter System Model B4, B6, B8, B10 (66-line display)

\* Specify #9843 on 4321 and 4331 must be ordered for attachment of the IBM Personal Computer AT/370 and XT/370.

- 3274 Control Unit Model 52C
  - 3178 Display Station
  - 3180 Display Station Model 1
  - 3268 Printer
  - 3278 Display Station
  - 3283 Printer
  - 3287 Printer
  - 4234 Model 1 Dot Band Printer

- 6580 Displaywriter System, Model A4, A6, A8, A10 (25-line display)
- 6580 Displaywriter System, Model B4, B6, B8, B10 (66-line display)
- 3276 Control Unit Display Station Model 11-14
  - 3178 Display Station
  - 3180 Display Station Model 1
  - 3278 Display Station
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3268 Printer Model 2
  - 3287 Printer
  - 3289 Line Printer
  - 4234 Model 1 Dot Band Printer
- 6580 Displaywriter System, Model A4, A6, A8, A10 (25-line display)
- 6580 Displaywriter System, Model B4, B6, B8, B10 (66-line display)

In addition the following devices can be attached at 38,400 bps:

- 3104 Display Terminal Models B1, B2
- 8775 Display Terminal Models 1,2
- 3232 Keyboard Printer Model 11
- 3287 Printer Models 11, 12
- 3274 Control Unit Model 51C, 52C, 61C with the associated terminals

For the attachment of 3640 terminals it is recommended to use a 3643 Keyboard Display or a 3641 Reporting Terminal on each Loop Control Unit for diagnostics and testing. These units do not need to be dedicated to this purpose.

Cable length for direct-attached loops can be up to 2,000m (1.25 miles) when operating at 38,400 bps, or 3,200m (2 miles) when operating at up to 9600 bps. For data link-attached loops see 3843 Loop Control Unit. For details refer to GA23-0038, "IBM Multiuse Communications Loop Planning Guide".

**Loop Installation:** For the required information to plan and install the Loop Adapter feature, the loop cables and accessories see the "IBM Multiuse Communications Loop Planning Guide", GA23-0038, and "Installation Guide", GA23-0039. The loop cables and accessories should be installed and checked out prior to attaching processors or devices.

The customer is responsible to enter the loop configuration and terminal addresses into the system using the loop adapter configuration tool invocable via a manual operation. Refer to "IBM 4331 Processor Loop Adapter Feature, Operating Procedures", GA33-1538, and "Problem Determination Procedures", GA33-1540.

Notes:

1. Loop "Accessories" are required to properly install the customer-owned loop. The customer is responsible to provide (purchase, install, test and maintain, problem determination) the loop cable and accessories for terminal attachment. See 4331-1 "Accessories" section for details and ordering information.
2. An unused lobe has to be terminated by a Loop Station Connector (wrap-type), P/N 1657320. Communications Facilities: See M2700 pages for communications facility requirements.

**Loop Adapter 1 (#4830):** Provides for direct attachment of a Loop with one or two Lobes (a lobe is the actual physical Loop cable). Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals and/or 3274-51C, 52C, 61C and/or 3276 Control Units or 38.4K bps for 3104 and/or 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals and/or 3274-51C, 52C, 61C Control Unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: One. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: Adapter power prerequisite (#1001).

**Loop Adapter 2 (#4831):** Provides for direct attachment of a Loop with one or two Lobes (a lobe is the actual physical Loop cable).

Transmission speed can be 9.6K bps for 3640 and/or 3104 and/or 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals, and/or 3274-51C, 52C, 61C and/or 3276 Control Units, or 38.4K bps for 8775 and/or 3232 Keyboard Printer Model 11 and/or 3287 terminals and/or 3274-51C, 52C, 61C control unit. Cable length for each lobe can be maximum of 3,200m (2 miles) for up to 9.6K bps, or maximum of 2,000m (1.25 miles) for 38.4K bps transmission speed. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: One. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: Loop Adapter 1 (#4830).

**Data Link Adapter (#4840):** Allows connection of one or more 3843 loop control units to the 4331 processor. The feature provides for the attachment of one external modem complying with EIA/CCITT recommendations. CCITT V.24/V.28 support will be provided for nonswitched lines only or a PTT-mandatory modem complying with CCITT recommendations. Transmission speed can be 2400, 4800, or 9600 bps, with half-speed option dependent on the attached modem. The modem can be connected to either a point-to-point or multipoint telecommunications line for connection of up to four 3843 loop control units which directly control the data link-attached loops. Support will be provided for the same terminals as on the direct-attached loop. Limitations: Can not be installed with 5424 adapter (#3901). Maximum: Two. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: Loop Adapter 1 (#4830). #2835 is required to permit attachment to PTT communications facilities in certain countries. (Japan only>One external cable (P/N 8482935) is required when attached to NTT or independent supplier modems in order to meet the self test requirements.<)

**Loop Adapter Logic Storage Requirements:** The microcode storage required for attaching terminals to the Loop Adapter 1 and 2 (#4830, #4831) or Data Link Adapters (#4840) has to be calculated from the table shown below. If Total 1 exceeds 65,536, an invalid configuration has been selected. If the sum of Total 1 plus Total 2 exceeds 98,304 an invalid configuration has been selected.

	Microcode Program Space Bytes	System Control Space Bytes
Microcode Base	42836	7880
One or multiple 3641 and/or 3647	7800	1060
One or multiple 3642	5900	580
One or multiple 3643 w/o #4920	8800	3450
One or multiple 3643 w/ #4920	9400	3450
One or multiple 3644	4900	-
One or multiple 3646	2900	256
One or multiple 3104 and/or 8775 and/or 3287, 3274, 3276, 3645	2600	-
Terminal*		
Control Space		
Each 3641, 3647	-	156
Each 3642	-	194
Each 3643	-	156
Each 3644	-	228
Each 3646	-	72
Each port on 3646	-	84
Each 3274, 3276, 3287, 3645, 3104, 8775	-	186
Each 3843	-	68
Each Loop Adapter (#4830, #4831)	-	1272
Each Data Link Adapter (#4840)	-	1204

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Total 1	Total 2

\* For additional information on buffer space refer to the "IBM 4331 Loop Adapter Characteristics", GA39-1534.

The storage requirements need to be validated because the number of devices of each type attached by the customer is not known to manufacturing. Manufacturing can only validate storage requirements with respect to device types but not with respect to the number of devices of each type.

**System Diskette Space Requirements:** When attaching the Loop Adapter feature with 364X terminals to the 4331 the diskette space requirements must be verified. See the following table for the space calculation. If the total number of records exceeds 3876, an invalid configuration has been selected. A trade-off between features must be considered.

4331 Model Group 11 Processor Feature Facility	System Diskette Records
4331 Basic	3133
DAS Compatibility #7901	170
Start/Stop Transmission Mode #968X	20
BSC Transmission Mode #967X	24
SDLC Transmission Mode #969X	52
364X Terminal Att. #9251, #9252, #9253, #9254, #9256	665

The maximum number of system diskette records may not exceed 3876.

**Maximum Number of Terminal Attachment Via Loop Adapters/Data Link Adapter:** The maximum number of terminals that can be attached to the 4331 processor via Loop Adapters/Data Link Adapters is 80, of which 62 can be any mix of 3644, 3645, 3287, 3104, 8775, 3232 Model 11 terminals or 3274-51C, 52C, 61C or 3276 Control Units.

Multiple terminals on a 3274 or 3276 control unit count as a single terminal in determining the maximum number of terminals.

A maximum of 64 terminals out of the total of 80 terminals may be attached to either Loop Adapter 1 or 2, or to one of the Data Link Adapters. For details see "IBM Multiuse Communications Loop Planning Guide", GA23-0038.

**Line Attach Base, Clocked Modems (#4695%):** This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-Terminating Equipment) which provide clocking and comply with CCITT V.24/V.28, V.35, X.21 or X.21bis recommendations and it is a prerequisite for attachment to X.21 nonswitched data network (X.21bis support is available through features #3701 and #4720). See the various line features below to determine when it is required. Limitations: A maximum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4695 installed reduces by one the number of feature #4696 allowable. Maximum: Eight, one per line installed. Field Installation: Yes. Prerequisites: #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

**Line Attach Base, Non-Clocked Modems (#4696%):** This feature is a prerequisite for all line adapters which attach to modems (Data Circuit-Terminating Equipment) which do not provide clocking. See the various features below to determine when it is required.

The clock speed internal to the feature is wired by default to 134.5 bps for Start/Stop operation and 1200 bps for BSC and SDLC operation. Otherwise, the clock speed can be wired at installation to one of the following:

Start/Stop: 75, 300, 600 or 1200 bps  
BSC: 600 bps  
SDLC: 600 bps

For BSC or SDLC operations, if 1200 bps is wired, then full-speed operation (1200 bps) or half-speed operation (600 bps) may be selected from the operator console keyboard. Limitations: A maxi-

mum of eight Line Attachment Bases may be installed on 4331 Communications Adapter. Each feature #4696 installed reduces by one the number of feature #4695s allowable. Maximum: Eight, one per line installed. Field Installation: Yes. Prerequisites: #1001 is required if more than three line attachments #4695 and/or #4696 are installed.

**High-Speed Modem Adapter (#4720%):** Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 64,000 bps. Limitations: For speed limitations refer to the Communication Adapter Base feature description. For channel rates achievable, see "IBM 4331 Channel Characteristics", GA33-1535. Cannot be installed with 231X DASD attached to the Block Multiplexer Channel. Cannot be installed with X.21 Adapter for Nonswitched Networks (#5655) if its speed is 48,000 bps #9831. Maximum: One. Cable Order: Required for attachment to the external modem. Field Installation: Yes. Prerequisites: #4695. Specify: BSC and/or SDLC operations are possible -- see Table 5 for Line Position Code and Transmission Mode Codes.

**(Canada only) 1200 bps Integrated Modem, Nonswitched (#4781%):** This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched BSC, Start/Stop or SDLC line via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps. Selection of 2- or 4-wire operation is made at installation time. Cable Orders: Required for attachment to external equipment. Maximum: Eight. Field Installation: Yes. Prerequisites: #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

**1200 bps Integrated Modem (#4782%):** Switched with Auto Answer. This feature may be intermixed with other line features. Each feature provides for the attachment of one switched network Start/Stop line via an integrated modem at speeds up to 300 bps and for BSC and SDLC at 600 and 1200 bps. Attachment to the switched network is via an IBM-provided cable to < (Canada only) > a Data Access Arrangement type CBS (or equivalent). < (Canada only) > Maximum: Eight. Cable Order: Required for attachment to external equipment. Field Installation: Yes. Prerequisites: #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

**1200 bps Integrated Modem (#4787%):** Nonswitched with Switched Network Backup and Manual Answer. This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and manual answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. Selection of 2- or 4-wire line operation is made at installation time. The cable group which is ordered also provides for attachment to a Data Access Arrangement type CDT or FCC-registered equivalent for manual answer. Maximum: Eight. Cable Order: Required for one cable group which connects to nonswitched line and to the switched network. Field Installation: Yes. Prerequisites: #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.

**1200 bps Integrated Modem (#4788%):** Nonswitched with Switched Network Backup and Auto Answer. This feature may be intermixed with other line features. Each feature provides for the attachment of one nonswitched line with Switched Network Backup (SNBU) and auto answer, allowing BSC, Start/Stop or SDLC operations via an integrated 1200 bps modem. The transmission speed can be strapped by the CE for Start/Stop operation up to 1200 bps and for BSC or SDLC operation at 600 or 1200 bps.

Attachment to the nonswitched line is via an IBM-provided cable. The same cable group provides for attachment to the switched network to a Data Access Arrangement type CBS or FCC-registered equivalent for auto answer. Maximum: Eight. Cable Order: Required for one cable group which connects to the nonswitched line

and to the switched network. Field Installation: Yes. Prerequisites: #4696. Specify: SDLC and/or BSC and/or Start/Stop operations are possible, see Table 5.<)

**Local Attachment Interface (#4801%x):** Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the CE at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a maximum distance between Communications Adapter and terminal of:

800 meters at 1200 bps  
400 meters at 2400 bps  
200 meters at 4800 bps  
100 meters at 9600 bps

The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. Cable Order: Required for attachment to terminal plate. Customer-supplied cable for in door use. Maximum: Eight. Field Installation: Yes. Prerequisites: #4695. Specify: SDLC and/or BSC operations are possible, see Table 5.

**X.21 Adapter For Nonswitched Networks (#5655):** Provides controls and circuits for attachment of one X.21 point-to-point or multipoint nonswitched communication line via a DCE complying with CCITT recommendation X.21. Transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point operations and 2400, 4800 and 9600 for multipoint operations. Limitations: If feature #5655 operates at 48,000 bps (specify #9831), then the following limitations apply: (1) High-Speed Modem Adapter (#4720) cannot be installed. (2) 231X DASD attached to the Block Multiplexer Channel (#1321) cannot be installed. (3) For speed limitations, refer to the Communications Adapter Base feature description. Maximum: Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter. Field Installation: Yes. Prerequisites: One #4695 is required for each #5655 installed. Specify: SDLC operation must be specified for this feature -- see Table 5 for line position, transmission mode and transmission speed codes. Note: #9831(%x) is required for 48,000 bps operation. Cable Order: Required for attachment to external equipment.

**Table 5 - 4331-11 Communication Adapter Configuration Feature and Position Codes**

	Req'd	Line	Pos.	
	Feat	Line	with	Line
	Num-	Att	Pos.	Codes
	ber	Base	1	2
(Part 1 of 2)	%x	%x	%z	%z
EIA/CCITT Inter-	3701	4695	9531	9532
face (for Clock-				
ed Modems) (8)				
EIA/CCITT Inter-	3701	4696	9521	9522
face (for Non-				
clocked Modems)				
(8)				
High-Speed Modem	4720	4695	9501	
Adapter (5)				
1200 bps Inte-				
grated Modems:				
Nonsw w SNBU	4788	4696	9641	9642
and Auto Answer				
Nonsw w SNBU	4787	4696	9631	9632
and Manual Answer				
Switched with	4782	4696	9651	9652
Auto Answer				
Nonswitched	4781	4696	9661	9662
X.21 Adapter for				
Nonsw Networks	5655	4695		
2400-9600 bps			0931	0932

48,000 bps				9831
X.21 Adapter for				
Nonsw Networks	5655	4695		
2400-9600 bps			9711	9712
48,000 bps				9831
(Except Canada>				
Switched with	2831	4696	0901	0902
Auto Answer (7)				
Nonswitched (9)	2832	4696	0911	0912<)
Local Attachment	4801	4695	9451	9452
Interface				
Autocall Unit	1020			
Interface (3)				
First			9541	9542
Second			9551	9552
Trans. Mode (4)				
BSC (1)			9671	9672
Start/Stop (2)			9681	9682
SDLC (1)			9691	9692

	Line	Position	with	
	Line	Position	Codes	
	4	5	6	7
	4	5	6	7
(Part 2 of 2)	%z	%z	%z	%z
EIA/CCITT In-	9534	9535	9536	9537
terface (for				9538
Clocked Modems)				
(8)				
EIA/CCITT In-	9524	9525	9526	9527
terface (for				9528
Non-clocked				
Modems) (8)				
1200 bps Inte-				
grated Modems:				
Nonsw w SNBU	9644	9645	9646	9647
and Auto Answer				9648
Nonsw w SNBU	9634	9635	9636	9637
and Manual Answer				9638
Switched with	9654	9655	9656	9657
Auto Answer				9658
Nonswitched	9664	9665	9666	9667
X.21 Adapter for				9668
Nonsw Networks				
2400-9600 bps	0934	0935	0936	0937
X.21 Adapter for				0938
Nonsw Networks				
2400-9600 bps	9714	9715	9716	9717
(Except Canada>				9718
Switched with	0904	0905	0906	0907
Auto Answer (7)				0908
Nonswitched (9)	0914	0915	0916	0917
<)				0918
Local Att.	9454	9455	9456	9457
Interface				9458
Autocall Unit				
Interface (3)				
First	9544	9545	9546	9547
Second	9554	9555	9556	9557
Trans. Mode (4)				9558
BSC (1)	9674	9675	9676	9677
Start/Stop(2)	9684	9685	9686	9687
SDLC (1)	9694	9695	9696	9697
				9698

**Notes:**

1. BSC or SDLC transmission mode with any line attachment feature.
2. Start/Stop transmission mode only with EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696) or with any other features offering 1200 bps Integrated Modems (with prerequisite #4696). (Japan only> Start/Stop transmission mode not available with NTT D-1 services (#2832 with #2943).<)

3. Must be associated with EIA/CCITT Interface (#3701 and prerequisite #4695 or #4696). Maximum of two #1020s may be installed.
4. The aggregate data rate of the Communications Adapter is 64,000 bps -- Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each transmission mode installed has different requirements for microcode storage -- see Table 2 for microcode storage requirements.
5. May not be installed when 231X DASD is attached to the block multiplexer channel.
6. When changing #9444 to/from #9471, no new hardware or diskette is required.
7. Maximum of 3 can be installed; no line position limitation.
8. (Japan only) > One external cable P/N 8482935 is required for each #3701 which attaches to NTT or Independent-supplier modems. See Cable Order Form.<)
9. (Japan only) > One specify code #2943 is required for each #2832 which attaches to NTT D-1 services. (If two feature #2832s attach to NTT D-1 services, then two #2943s must be specified.) This provides NTT Quick Disconnect and network wrap capability.<)

Legend:

%x: Feature supplies diskette for System Diskette facility.

%z: System Diskette-only specify feature. No fee when ordered at time of manufacture or with chargeable feature that supplies diskette.

## MODEL CONVERSIONS

- \* UPGRADES FROM 4321/4331 TO 4361 PROCESSORS ARE NO LONGER AVAILABLE.

**Model Conversions within Model Group:** Can be made in the field. Customer price quotations and customer order acknowledgement letters for purchase model conversions must state:

"Installation of this model upgrade involves the removal of parts which become the property of IBM."

Field upgrade from 4331 Model Group 1 to 4331 Model Group 11 is possible. The 4331 Model Group 11 can be field upgraded to 4331 Model Group 2.

Downgrades from 4331 Model Group 2 to 4331 Model Group 11 and from 4331 Model Group 11 to 4331 Model Group 1 are not recommended for field installation. Refer to "Equipment Orders" in the GI section of for details of this "Not Recommended for Field Installation" classification.

Field Upgrade from 4331 Model Group 1 to 4331 Model Group 2, refer to machine pages for 4331 Model Group 1 and 2.

### Field Upgrade:

**From 4331 Model Group 1 to 4331 Model Group 11:** When a leased 4331 Model Group 1 is upgraded to the 4331 Model Group 11, features and specifications installed on the 4331 Model Group 1 which are not available on the 4331 Model Group 11 should be deleted with the upgrade MES order. Features installed on the 4331 Model Group 1 which are standard on the 4331 Model Group 11 should be deleted, i.e., changed to standard, for record purposes. Features which are standard on 4331 Model Group 11, but are not installed

on a leased 4331 Model Group 1 being upgraded, are automatically added to the configuration.

For upgrade of a purchased 4331 Model Group 1 to 4331 Model Group 11 features installed on the 4331 Model Group 1 which are not available on the 4331 Model Group 11 have to be removed. An RPQ has to be submitted listing each feature to be removed. There will be a charge for this RPQ. The features removed are the customer's property.

Standard features of the 4331 Model Group 11 not installed on the 4331 Model Group 1 must be ordered via RPQ with the upgrade MES. The 4331 Model Group 1 prices of these features are added to the model upgrade prices.

Standard features of the 4331 Model Group 11 already installed on a purchased 4331 Model Group 1 should be deleted, i.e., changed to standard, for record purposes.

Feature	Feature on 4331 Mdl Grp 1	RPQ for Adding to Mdl Grp 11
Block Multiplexer Channel	#1421	7B0811
Communication Adapter Base	#1601	7B0816
Control Storage Expansion	#1901	7B0697
Display/Printer Add'l Expansion	#2001	7B0813
DASD Adapter	#3201	7B0814
8809 Adapter	#4910	7B0815
Byte Multiplexer Channel	#5248	7B0810
Power Interface	#5531	7B0812

**From 4331 Model Group 11 to 4331 Model Group 2:** Standard features of the 4331 Model Group 11 which are to be retained on the 4331 Model Group 2 have to be included in the MES order using the individual feature and specify codes of the 4331 Model Group 2.

Order for the 4331 Model Group 2 Processor:

Block Multiplexer Channel	#1421
Communication Adapter Base	#1601
Display/Printer Add'l Expansion	#2001
DASD Adapter	#3201
8809 Adapter	#4910
Byte Multiplexer Channel	#5248
Power Interface	#5531
3340/3344 Direct Attachment (If required)	#7851
ECPS: VM/370 (VM assist) (if required)	#8701

Other features or specifies on the 4331 Model Group 11 are retained unchanged on the 4331 Model Group 2.

## ACCESSORIES

See M4331-1 "Accessories" for additional information and field installation of Console Table (#1550), Book Rack and Cable Holder (#1480) and "Loop Accessories" and "Loop Cables".

## SUPPLIES (NONE)

## 4341 PROCESSOR

(NO LONGER AVAILABLE ...features and model conversions can be ordered on an "as available" basis.

### PURPOSE

Provides power, control, logic and memory circuitry for the arithmetic, logic and processor storage functions of the 4341 Processor.

### MODELS

			Bytes of Processor Storage
Mdl Grp 9 J9 K9 L9	Mdl Grp 10 K10 L10	Mdl Grp 1 K1 L1	1,048,576 2,097,152 4,194,304
Mdl Grp 11 K11 L11 M11	Mdl Grp 2 K2 L2 M2 N2 P2	Mdl Grp 12 K12 L12 M12 N12 P12	2,097,152 4,194,304 8,388,808 12,582,912 16,777,216

**Note:** The microcode which controls system operations resides in Reloadable Control Storage and keeps dynamic tables in Processor Storage, thus reducing the amount of Processor Storage available for user programming. See "Microcode Storage Requirements" below for details.

**Prerequisites:** Each 4341 Processor requires one 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C and Operator Console Keyboard with an operator control panel.

**Minimum System:** See "Minimum Configurations" in "Systems" for minimum I/O units required for the 4341 Processor.

### HIGHLIGHTS

From 2,097,152 to 16,777,216 bytes of monolithic processor storage depending upon the mdl -- see "Models" above.

Processor base cycle time in nanoseconds:

Mdl Groups		
Grp 9 150-300	Grp 10 150-300	Grp 1 150-300
Grp 11 120-240	Grp 2 120-240	Grp 12 115-230

8-byte parallel data flow within the processor as well as an 8-byte wide data flow between the processor, storage and channels.

Processor High-Speed Buffer storage in bytes:

Mdl Groups		
Grp 9 2,048	Grp 10 4,096	Grp 1 8,192
Grp 11 8,192	Grp 2 16,384	Grp 12 16,384

Buffer storage is transparent to the program and significantly reduces the effective access time of storage. Buffer storage does not

increase the amount of addressable storage. Extensive data checking, error recording by the hardware itself and remote maintenance are coupled with increased availability and serviceability.

### Standard Features:

- Virtual Storage Capability by Dynamic Address Translation
- Byte and Block Multiplexer Channels
- Data Streaming Mode
- One-Level Addressing Facility for Improved Virtual Storage Control by DOS/VSE (ECPS:VSE Mode)
- Channels with Virtual Storage Addressing (ECPS:VSE Mode)
- 128-1024 UCWs
- Channel Indirect Addressing in S/370 Mode
- Channel Command Retry
- EC and BC Modes
- Byte Oriented Operands
- Clock Comparator and CPU Timer
- Control Registers
- Error Checking and Correction in Processor Storage
- Extended Control-Program Support for DOS/VSE, VS1, VM/370 and MVS
- Extended Precision Floating Point
- Interval Timer
- Machine Check Handling
- Support Processor
- Instruction Retry
- Program Event Recording
- Reloadable Control Storage
- Storage Protection (Store and Fetch)
- S/370 Universal Instruction Set
- System Diskette Drive
- Time-of-Day Clock
- PSW Key Handling
- Compare and Swap and Compare Double and Swap
- Clear I/O
- External Signal
- Unit Power Off
- Move Inverse Instruction (not software supported)
- Engineering Scientific Assist (Multiply Add facility) on Mdl Group 9, Mdl Group 10, Mdl Group 11, Mdl Group 2 and Mdl Group 12 Processors
- Fast Release for the Start I/O Fast Release Instruction for the Mdl Group 12

**Modes of Operation:** Two modes of operation are available. The mode is selected from a common diskette at Initial Microcode Load (IML) time.

- ECPS:VSE Mode - allows operation of an appropriately generated DOS/VSE system, offering potential for enhanced systems performance.
- S/370 Mode - allows operation of any program written for S/370 and S/360 that does not violate the exceptions noted under "Compatibility" below. Note: DOS/VSE in S/370 Mode will not operate on 12MB and 16MB models, except under VM/370. See the Programming Support Section for those SCPs which contain 4341 support. In this mode, two performance options and an MVS support option are available. These options are selected at IML time and are mutually exclusive on Mdl Group 9, Mdl Group 10, Mdl Group 1 and Mdl Group 11 processors. On Mdl Group 2 and Mdl Group 12 processors with ECPS Expansion Feature (#1601), ECPS:VM/370 and ECPS:VSE can operate concurrently.
- ECPS:VS1 - hardware assist that reduces the processor time needed to execute certain frequently used supervisor functions in OS/VS1, Release 7. The functional areas include:

IOS  
SVC FLIH  
System Trace  
Page Management

**Note:** OS/VS1 Release 7 with or without OS/VS1 Basic Programming Extension will operate on 12MB and 16MB mdl's, but the SCP will only access up to 8MB. However, when OS/VS1 runs as a guest SCP under VM/370 and the VM Handshaking feature is specified, an OS/VS1 system can utilize up to 16MB.

- ECPS:MVS - hardware facility that provides 14 privileged instructions necessary to allow the 4341 processor to be supported by the MVS System Product - JES2, 5740-XYS, and MVS/System Product - JES3, 5740-XYN. The instructions involve the following MVS functional areas:

- SVC Interrupt Handling
- Integrity
- Tracing
- Lock Management
- Real Storage Management

On Mdl Group 2 and Mdl Group 12 processors, the ECPS:VSE hardware facility is extended to include the dual address space facility a function supported by MVS/System Product-JES2 Release 3 and MVS/System Product-JES3 Release 3 and defined in IBM System/370 Principles of Operation, GA22-7000-7. This extension facilitates communication among address spaces in an MVS/SP environment. In addition, the extensions include the ADD FRR instruction and the Page Fault Assist function, defined in IBM System/370 Assists for MVS, GA22-7079-1.

- ECPS:VM/370 - hardware assist that reduces the processor time needed to execute certain frequently used supervisor functions in VM/370 Release 6. The functional areas include:

- Virtual Machine I/O
- Storage Management
- SVC Handler
- Privileged Instruction Emulation
- Dispatching
- Virtual Interval Timer

On Mdl Group 2 and Mdl Group 12 processors, whenever ECPS:VM/370 and ECPS:VSE are both selected at IML time, ECPS:VM/370 is enhanced to include the functions of the Shadow-Table Bypass Assist defined in Virtual Machine Assist and Shadow-Table-Bypass Assist, GA22-7074. These functions are defined to enhance the performance of MVS running under VM/370 in a V=R environment with VM System Extensions Release 2 or VM/System Product. (#1601, ECPS Expansion Feature is required.)

The Engineering/Scientific Assist can be used in both modes of operation.

**Control Storage Requirements:** (Mdl Group 2 and 12) ECPS Expansion Feature (#1601) is required to support concurrent operation of ECPS:VM/370 and ECPS:VSE.

**System Diskette Drive:** This is the basic microcode loading device for the system. The several removable diskettes that will be sup-

plied with the system will contain all of the required microcode for CE diagnostics, basic systems features, plus the optional features ordered for the system. The System Diskette File also allows recording of system failure data for later CE diagnostics.

In addition, the system diskette file provides automated Problem Analysis for use by console operators and system programmers. Basic data are collected and analyzed. Messages are displayed which describe system problems or status and suggest corrective actions. Options are included for sending service information to IBM via RSF and for running an additional processing unit analysis test when required.

**Console Function:** A 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C and Operator Console Keyboard with an operator control panel is required. It is the principal device provided for the operator to communicate with the system. The operator may use the keyboard and the display to control the system operation as well as to display the status of the system. The primary Operator Console Keyboard includes the operator control panel. The 3278 mdl 2A and 3279 mdl 2C has a screen size of 1,920 characters, 24 lines at 80 characters per line. The bottom four lines (lines 21-24) are reserved for system status information and are not accessible to the user. 3278/3279 features other than those basic to the primary console display/keyboard are not supported. Up to three optional (for a total of four) 3278 Operator Display Consoles mdl 2A or 3279 Color Operator Display Console mdl 2C or 3268 Printer mdl's 2 and 2C or 3287 Printers mdl 1, 2, 1C or 2C for hard copy output are also available in any combination.

Two console modes are available -- "Display Mode" and "Printer-Keyboard Mode". In "Display Mode", the keyboard is used for input, the display with 20 lines of 80 characters/line for output, and DOS/VSE, OS/VS1 Release 7 to VM/370 Release 6 or MVS Release 3.8 with the MVS/System Product-JES2 or MVS/System Product-JES3 support is required. The optional 3268 Printer mdl's 2 and 2C or 3287 Printer mdl 1 or 2 has a separate address. In "Printer-Keyboard Mode", the 3278 mdl 2A Display Console or 3279 mdl 2C Color Display Console uses the keyboard for input and the display and a recommended 3268 Printer mdl's 2 and 2C or 3287 Printer mdl 1 or 2 or 3287 Color Printer mdl 1C or 2C for output. The display/keyboard and 3268 Printer mdl's 2 and 2C or 3287 Printer mdl 1 or 2 or 3287 Color Printer mdl 1C or 2C appear to the system as a Console Printer-Keyboard. This allows the 4341 Processor user to run an operating system which has been generated for use on a S/360 with a 1052 typewriter keyboard console or a S/370 with a 3210 or 3215 console.

**Channels Mdl Group 9, Mdl Group 10 and Mdl Group 1:** Six channels in two groups are available. Group 1 (standard) consists of 1 byte multiplexer channel and 2 block multiplexer channels. Group 2 (optional) consists of 3 block multiplexer channels. One of the 2.0 million byte per second block multiplexer channels in the second group (channel 4) can be optionally selected as an additional byte multiplexer channel.

The following table shows the Block Multiplexer speed in million bytes per second for the following Mdl Groups:

Mdl Group 1, 9, 10

	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	-	-	-	6

## MACHINES

Option 2	byte	3	3	2	2	1	11
Option 3	byte	3	3	2	byte	1	9

**Channels Mdl Group 11, Mdl Group 2 and Mdl Group 12:** Six channels are standard, consisting of one byte multiplexer channel and five block multiplexer channels. One of the block multiplexer channels can be optionally selected as an additional byte multiplexer channel.

The following table shows the Block Multiplexor speed in million bytes per second for the following Mdl Groups:

### Mdl Group 2, 11

	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	2	2	2	12
Option 2	byte	3	3	2	byte	2	10

### Mdl Group 12

	Group 1			Group 2			Total
	0	1	2	3	4	5	
Option 1	byte	3	3	2	3	2	13
Option 2	byte	3	3	2	3	byte	11
Option 3	byte	3	3	2	byte	2	10

Data Streaming Mode can operate on any 4341 block multiplexer channel up to the maximum data rates specified above.

The capability for the attachment and automatic I/O power sequencing of up to 24 separate control units is standard. Optionally, 48 control units can be attached. An optional Channel to Channel Adapter is also available.

**Compatibility:** Any program written for S/370 will operate on the 4341 Processor in S/370 Mode, provided that it (1) is not time-dependent, (2) does not depend on system facilities (storage size, I/O equipment, optional features, etc.) being present when the facilities are not included in the configuration, (3) does not depend on system facilities (such as operation codes) being absent when the facilities are included in the 4341 Processor, and (4) does not depend on results or functions which are defined in the Principles of Operation to be unpredictable or model-dependent.

Any program written for S/360 will operate on the 4341 Processor in S/370 Mode, provided that it follows the above rules and does not depend on functions that differ between S/360 and S/370.

Any program written for the 4331 Processor in ECPS:VSE Mode or S/370 Mode will operate on the 4341 Processor, provided it follows the above rules. Note: DOS/VSE and prior DOS releases in S/370 Mode will not operate on the 4341 12MB and 16MB models, except under VM/370.

For more details, see S/370 Principles of Operation, GA22-7000, or 4300 Processors Principles of Operations for ECPS:VSE Mode, GA22-7070.

**Microcode Storage Requirements:** The microcode which controls system operations resides in Reloadable Control Storage and

keeps dynamic tables in Processor Storage, thus reducing the amount of Processor Storage available for user programming. The amount required is the sum of Processor Storage required by two user selectable options: (1) the number of Unit Control Words (UCWs) selected, and (2) the mode of operation.

### 1. Number of UCWs:

128 UCWs are basic on the 4341 and require 8,192 bytes of Processor Storage. Additional UCWs are allocated as required in groups of 32, each group requiring an additional 2,048 bytes of Processor Storage. The maximum number of UCWs on 4341 is 1,024.

UCW assignment is user-dependent. It is the customer's responsibility to designate desired I/O addresses and configurations to service personnel. Channel configurations should be reviewed during pre-installation planning for new systems and when additional I/O devices are attached or existing equipment is reconfigured.

For specific device requirements, see the appropriate machine pages.

### 2. Depending on which mode of operation is selected at IML time, processor storage will be required as follows:

		Mode of Operation	
		ECPS:VSE Mode (bytes)	S/370 Mode (bytes)
4341 J9 K1 K2 K9			
K10 K11 K12	49,152	10,240	
4341 L1 L2 L9			
L10 L11 L12	51,200	10,240	
4341 M2 M11 M12	55,296	10,240	
4341 N2 N12	59,392	10,240	
4341 P2 P12	63,488	10,240	

**Publications:** GC20-0001

## SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

### ● Power (AC, 3-phase, 4-wire):

50 Hz	60 Hz
200V #2807	200V #2733
220V #2815	208V #9903
380V #2816	220V #2800
400V #2825	240V #9915
415V #2826	

### ● Machine Nomenclature:

Canadian French #2935  
English US #2924  
Portuguese (Brazil) #2933  
Spanish #2931

### ● Cabling: For the primary console with Operator Control Panel (OCP) signal and control cables are shipped with the processor. 7.6m (25 feet) is standard. Cables longer than 7.6m (25 feet), up to a maximum length of 45.6m (150 feet) may be obtained by RPQ. Each additional console device (without OCP) requires a cable order. For cable order information, refer to the 4300 Processor Installation Manual - Physical Planning, #GA24-3667.

### ● Color: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9063 for classic blue, #9064 for charcoal brown, #9065 for pebble gray. Note: #9061, #9062, #9063 are

slightly different colors from those available on previous machines.

- **Dimensions:** The normal dimensions of the larger of two 4341 Processor frames are 62-3/4" x 32" x 39-1/2". Dimensions can be reduced to 60" x 29-1/2" x 38-1/2", if required, by local customer engineering. No materials need to be ordered.
- **Remote Support Facility:** The Remote Support Facility utilization (RSF) is a customer option. It is recommended to enhance the hardware maintenance of the 4341 Processor. It provides service personnel the capability of remotely controlling the 4341 from any RETAIN terminal and allows the IBM CE to access the RETAIN Data Bank for the latest service aids and information from the customer site. When RSF is selected, the customer must provide the telephone lines required for the RSF Modem. The customer must also arrange for the connection of the telephone interface cable provided by IBM to the telephone network.

For All Countries except Japan and Canada: When specified, each 4341 Processor will be equipped with either a CCITT Interface or 1200 bps Integrated Modem (switched network, manual answer) for the Remote Support Facility (RSF). Specify #2838 for CCITT Interface or #2836 for 1200 bps Integrated Modem, switched network, manual answer.

For Canada: Specify #9510 for integrated modem, 1200 bps, switched network, manual answer. A telephone set with exclusion key and with Data Access Arrangement (DAA), compatible with CDT Type Coupler Series 1000A interface and operation, is required.

For Japan: Each 4341 Processor requesting RSF will be equipped with either a CCITT Interface or 1200 bps Integrated Modem. Specify #2838 for CCITT Interface for Acoustic Coupler. Specify #2944 for 1200 bps Integrated Modem. Also specify #2943 for the NTT CA-2 Modem service cable connector.

If Remote Support Facility is not desired, no specify code is required.

- **Remote Operator Console Facility:** The Remote Operator Console Facility (ROCF) is an extension of RSF. It gives personnel at a host site the ability to dial-up and control a remote 4341 by means of a 3275 mdl 2 Display Station or by means of host site programming support.

For All Countries Except Canada and Hong Kong: Specify RSF feature #2836 for an Integrated 1200 bps Modem with auto answer capability or #2838 as CCITT interface. CCITT interface is for attaching customer-supplied or PTT mandatory modems meeting CCITT recommendation V.23/V.24/V.28. The customer-supplied modem must include auto answer.

For Canada: Specify #9511 for EIA-Interface, 1200 bps, switched network. This feature is used by both the RSF and the ROCF functions. An external modem compatible with the WE202S modem, interface and operation, or equivalent is required. The external modem must include auto answer.

For Hong Kong: Specify RSF feature #2838 as CCITT interface and feature #2839. This interface is for attaching customer-supplied or PTT mandatory modems meeting CCITT recommendation V.23/V.24/V.28. The modem must include auto answer.

**Note:** Feature code #2836 operates in manual mode when used with RSF and Auto Answer mode when used with ROCF.

## SPECIAL FEATURES

**ECPS Expansion (#1601):** (Mdl Group 2 or 12) Adds 16,384 bytes of control storage. See "Control Storage Requirements" under "High-lights" for details. Maximum: One. Field Installation: Yes. Field installation of #1601 involves the removal of parts which become the property of IBM. Prerequisites: A 4341 Mdl Group 2 or Mdl Group 12 Processor.

**Channel-To-Channel Adapter (#1850):** One channel to channel feature is optionally available to interconnect two channels (4300 Processor, S/360, S/370) - one of the processors requires this feature - requires one control unit position on each of the connected channels. (If a 4381 Processor is one of the machines connected via a channel-to-channel adapter, three control unit positions are required on each processor.) Maximum: One. Field Installation: Yes. Prerequisites: (1) #4631 must be specified on the primary 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C. (2) One control unit position on a block multiplexer channel. (Three positions required on the 4381 and each processor connected to it.) Specify: Feature code #2727, 76-Key Japanese English Operator Console Keyboard Channel-to-Channel, may be specified on the primary 3278 mdl 2A or 3279 Color Display Console mdl 2C in lieu of #4631.

**Block Multiplexer Channels Add'l (#1870):** (Mdl Group 9, 10, 1) An optional group of three block multiplexer channels permits simultaneous operation of high speed devices at a data rate of 2.0MB/second for two channels and 1.0MB/second for one channel. One of the 2.0 million byte per second block multiplexer channels in the second group (Channel 4) can be optionally selected as an additional byte multiplexer channel at installation time. Limitations: Not available on 4341 Mdl Group 2, 11, or 12 since five block multiplexer channels are standard. If installed on a 4341 Mdl Group 1, 9, or 10, this feature designation should be deleted with the order entry for conversion to a 4341 Mdl Group 2, 11, or 12. This is for order entry purposes only. The channels are not physically removed when upgrading. Maximum: One. Field Installation: Yes. Prerequisites: A 4341 Mdl Group 1, 9, or 10 Processor.

**Channel Control Unit Positions, Add'l (#1890):** This feature is required for the automatic I/O power sequencing of more than 24 control units from the 4341 Processor. Standard on the 4341 is the capability to attach up to 24 control units, not to exceed eight per channel. With this feature, 25 to 48 Control Units may be attached and automatically powered up, not to exceed eight per channel. Maximum: One. Field Installation: Yes. prerequisites: #1870 on Mdl Group 9, Mdl Group 10 or Group 1 Processor.

## MODEL CONVERSIONS

The following field upgrades are possible:

- Model Group 10 to Model Group 11
- Model Group 1 to Model Group 2
- Model Group 1 to Model Group 11
- Model Group 10 to Model Group 12
- Model Group 1 to Model Group 12
- Model Group 11 to Model Group 12
- Model Group 2 to Model Group 12
- Model Group 9 to Model Group 10

See Block Multiplexer Channels, Add'l (#1870) in "Special Features". Customer price quotations and customer order acknowledgment letters for purchase MESSs must state: "Installation of a model upgrade and special feature additions involves the removal of parts which become the property of IBM." Other model changes and storage downgrades are not recommended for field installation.

**Model Upgrade:** RPY S00468 is required for upgrade of purchased 4341 Mdl Group 10 or 4341 Mdl Group 1 when Block Multiplexer Channels Add'l (#1870) is not installed on the machine to be upgraded.

## ACCESSORIES

The following items are available on a purchase-only basis. For shipment with machine, order the P/N indicated below.

**Bookrack and Cable Holder (#1480):** Provides a storage rack for use with Console Table (#1550) only. Up to four racks can be mounted on one table.

**Console Table, 4300 Processors (#1550):** Provides a convenient workstation table to support one or two 3278 mdl 2As/3279 mdl 2Cs.

## SUPPLIES (NONE)

## 4361 PROCESSOR MODEL GROUPS 3, 4, 5

### PURPOSE

Provides the power, control, logic and memory circuitry necessary for the Processor Central Electronic Complex including I/O channels and integrated device adapters.

### MODELS

ALL MODELS ARE NO LONGER AVAILABLE

	Model Grp 3	Model Grp 4	Model Grp 5	Processor Storage (bytes)
Model	K03	K04	K05	2,097,152
Model	L03	L04	L05	4,194,304
Model	---	LK4	LK5	6,291,456
Model	---	M04	M05	8,388,608
Model	---	ML4	ML5	12,582,912
Model	---	N04	N05	16,777,216

**Performance:** Internal throughput factors, relative to the 4331 Model Group 2, are approximately as follows:

Model Group	3	4	5
-------------	---	---	---

Workload:  
Engineering/Scientific (VM)

Floating-Point Accelerator Feature #1100

	W/O #1100	With #1100	Standard	
Short Precision	1	1.4	3.3	4.2
Long Precision	1	2.2	6.6	6.6
Commercial (VSE)	1	1	2.4	3.3
Interactive (VM/CMS)	1	1.1	2.9	3.5

### HIGHLIGHTS

The 4361 Processors are designed as one physical unit including all channel and attachment functions, and the service processor.

#### Model Group 3:

- Processing unit for instruction processing and control of I/O operations with:
  - Floating-Point multiply hardware accelerator (optional feature available at time of manufacture only) using high speed array multiplier logic. It improves floating-point multiply instruction execution times by a factor of 3 to 8 over microcode implementation.
  - Microcode assisted execution of functions supported in the Elementary Math Library (EML PRPQ P81005, 5799-BTB) to improve the performance of engineering/scientific programs.
  - Processor storage of 2 or 4 megabytes.

Data flow is four bytes parallel. Processor fetch from the cache is in two cycles of 100 nanoseconds each for four bytes. The cache is automatically replenished from main storage in 64-byte blocks. The

64-byte fetch cycle requires 2.6 microseconds, the store cycle requires 3.6.

#### Model Groups 4 and 5:

- Instruction processing unit with:
  - Implementation of frequently used instructions in hardware rather than in microcode.
  - Floating-Point multiply hardware accelerator using high speed array multiplier logic. It improves floating-point multiply instruction execution times by a factor of 3 to 8 over microcode implementation.
- Channel processor which controls integrated I/O attachments and the I/O interface channels. It operates concurrently with the instruction processing unit for maximum throughput.
- Processor storage from 2 to 16 megabytes.
- Support of the Start I/O Fast Release instruction with queuing of I/O requests on the model group 5.

Data flow is four bytes parallel within the processors and eight bytes parallel between the processors and main storage. Processor fetch cycles from the cache are 100 nanoseconds each for four bytes. The cache is automatically replenished from main storage in 64-byte blocks. The 64-byte fetch cycle requires 1.9 microseconds, the store cycle requires 2.2.

#### All Models:

- Service processor which controls the operator console, the maintenance and service functions and the locally attached displays, printers, and diskette drive.
- High-speed cache buffer storage with 100 nanoseconds cycle speed (8Kb on model groups 3 and 4, 16Kb on model group 5).
- High-speed reloadable control storage.
- A High-Accuracy Arithmetic Facility that allows computational procedures with, where possible, maximum accuracy (as defined below) and algorithmic verification of results.
- Programmable power-off via Diagnose instruction that allows shut-down of the processor under program control.

**Microcode:** The microcode, controlling systems operations resides in reloadable control storage and processor storage. Approximately 270K bytes (model group 3) or 350K bytes (model groups 4 and 5) of processor storage are occupied by microcode, RAS workspace and system data. The approximate processor storage available to the user is obtained by subtracting 270,000 or 350,000 bytes from the nominal storage size of a given model. When directly attached 3340 or DAS Compatibility is used (in model groups 4 and 5 only), approximately 100K of additional storage is required for I/O buffers.

The system diskette facility is the microcode loading system for the 4361 Processors. The facility includes two diskette drives, and the second is available to the user after initial microcode loading. The diskettes shipped with the processor supply the microcode for diagnostics, standard functions, and the optional features. The facility is also used for the recording of log data for analysis by the customer engineer, and for the Problem Finder (PROFI) facility.

**Operational Modes:** The 4361 Processor operates in either S/370 mode or in Extended Control Program Support ECPS/VSE mode. The mode is selectable at Initial Program Load (IPL) time.

ECPS/VSE supports operation of an appropriately generated VSE or SSX/VSE system. S/370 mode allows operation of VSE, VM/370, VS1 or MVS (MVS on model group 5 only).

## STANDARD FUNCTIONS

**High-Accuracy Arithmetic Facility (ACRITH):** The High-Accuracy Arithmetic Facility is included. New floating-point instructions are implemented in the 4361 for computation of the basic arithmetic operations (+, -, x, /) and the scalar (dot) product with maximum accuracy, providing directed rounding (up, down, to nearest, to zero) for the short and long floating-point hexadecimal formats. Maximum accuracy means, there is no floating point number between the exact result (at infinite precision) and the rounded result.

The Program Product, High-Accuracy Arithmetic Subroutine Library (ACRITH), provides subroutines which can be called from VS FORTRAN or Assembler in the environments of VM/SP, VSE/SP, and VM/PC on the Personal Computer XT/370. On the model group 5 it is also supported under MVS/SP.

**Attachment Capability for Intelligent Workstations:** Attachment of intelligent workstations to the Display/Printer Adapter (DPA) or to the new Workstation Adapter (WSA), or to a channel via a 3274 control unit or via the 4994 ASCII Controller, or to the Communications Adapter is as follows:

No.	Attachment Via:	DPA	WSA	Control Unit	CA Protocol
1	6580 Displaywriter System	Yes	Yes	3274	All
2	3270 Personal Computer (5271) and 3270 PC/AT (5273)	Yes	Yes	3274	---
3	PC with 3270 Emulation	---	---	---	BSC/SDLC
4	PC with 3101 Emulation	---	---	4994/7171	S/S
5	PC XT/370 and PC AT/370	Yes	Yes	3274	---
6	PC and 6150, 6151 with 3278/3279 Emulation Adapter	Yes	Yes	3274	---
7	3270 PC Attachment to 3278/3279	Yes	Yes	3274	---
8	3270 PC/G, PC/GX and AT/G, AT/GX	---	Yes	3274	---

Description of numbered items above:

- 1. The 6580 Displaywriter System can be attached directly to the 4361 via the DPA, the WSA or remotely connected via the Communication Adapter. These attachments provide additional capability for office applications. Several emulation features on the Displaywriter enable access to S/370 host environments.
- 2. The 3270 Personal Computer (5271) provides multiple simultaneous applications, PC or host, sharing one physical screen. A new screen management enables dynamic placement and alterations of application view areas. Utility programs for the workstation and for VSE/SP, SSX/VSE, VM/CMS and MVS/TSO provide functions like: bidirectional file transfer, screen copy, keystroke recording, translation between ASCII and EBCDIC and more.
- 3/4. The Personal Computer (all models) can attach directly to the 4361 via the Communication Adapter. With the appropriate PC features the following devices can be emulated: 3101 and TTY terminals, 3268-2, 3275-2, 3276-2, 3277-2, 3278-2, 3279-2A, 3284-2/3, 3287-2, 3288-2 and 3770.
- 5. The Personal Computer XT/370 (5160) or AT/370 (5170) can be attached via the Display Printer Adapter, Workstation Adapter and the 3274 Control Unit. Only the Control Unit Terminal (CUT) mode is supported. This feature provides a single-user CMS environment allowing execution of many S/370 programs in the Personal Computer. Access to host applications in 3270 mode is also supported. In addition to both of the above modes all the functions of a standard PC are available.
- 6. The Personal Computers (5150, 5160, 5170, 6150, 6151) with the 3278/3279 Emulation Adapter provides native PC operation concurrent with 3278/3279 emulation using a 'hotkey' to switch between modes. File transfer capability is the same as for the 3270 Personal Computer (Item 2 above).
- 7. The 3270 Personal Computer Attachment utilizes the 3278/3279 display monitor and keyboard together with the PC system unit providing concurrent operation of host and PC programs. This configuration, however should not be confused with the 3270 PC (5271) and its advanced function. Furthermore, the file transfer function from PC to host and screen capture functions to PC printer or diskette are supported only if the 3278/3279 is attached via the 3274.
- 8. The 3270 PC/G, PC/GX AT/G, AND AT/GT workstations add new displays and display attachment units specially suited for

graphics functions with powerful interactive and output graphics capability.

**Serial OEM Interface (SOEMI):** This interface can be used to attach a variety of non-IBM subsystems and devices to the DPA/WSA. A protocol based on structured fields is implemented in microcode and can be used by standard S/370 I/O instructions, providing the user full programming flexibility. OEM adapters are required to attach the subsystems and devices to the SOEMI in order to provide the appropriate conversions and control functions. Examples are the attachment of subsystems based on board-level macrocomputer devices using non-IBM standards, e.g., IEEE 796. The DPA supports up to two SOEMI adapters with an aggregate data rate of up to 17K bytes/second (inbound) or 30K bytes/second (outbound), the WSA supports up to four SOEMI adapters with an aggregate data rate of up to 22K bytes/second (inbound) or 45K bytes/second (outbound).

**Console Function:** An operator's display console, keyboard, and control panel is a prerequisite for use of the system. The display console can be a 3278 model 2A, a 3279 model 2C (color) with keyboard feature #4634, or a 3205 model 1 (color). The operator display console should be close to the processor to assure legibility by the CE working on the processor.

**Note:** A new integrated operator control panel (IOCP) is required for attachment of the 3205. The IOCP will be available on all new 4361 processors shipped after (Canada only > March 31, 1985). <) (Except Canada > April 30, 1985. <) For 4361 processors shipped prior to that date or for 4331s upgraded to 4361s, RPQ 7B0987 must be ordered for field installation.

A maximum of 20 of the 25 lines on the display may be used for system communication; four lines are reserved for messages from the 4361 Processor, and one line displays messages unique to the 3278 model 2A or the 3279 model 2C. The console address is selected at system installation time. Note: Certain MVS components, such as DCCF require output to a 24-line display. In these cases, an alternate console must be assigned to a terminal other than the operator console.

The console can operate in "Display Mode" or in "Printer/Keyboard Mode".

- Display Mode, the keyboard is used for input and the CRT, with 20 eighty-character lines, is used for output. The 3287 or the 3268 Printer, if attached, has its own address and is supported as an independent device.
- In Printer/Keyboard Mode, the console and an optional printer have a single address, and operation is in single-line mode

## MACHINES

compatible with the 1052/3210/3215 devices of the older S/360 and S/370.

Printer/Keyboard Mode is selected at IPL time and is exclusive with the 4250 Image Printer operation and with SOEMI operation on the DPA. (Japan only) It is also exclusive with certain language options of devices attached to the Display/Printer Adapter (example Katakana).< )

**Remote Operator Console Facility (ROCF):** ROCF is an extension of the Remote Support Facility (RSF) that enables an operator at a host location to IML/IPL a remote 4361 and execute other manual control functions via a 3275 display station, or via a 3275 emulated on a host attached 3270 or emulated on a Personal Computer.

**Programmable Power-Off:** A programmable power-off function is available via a S/370 diagnose instruction. It enables the user to power-off the processor under program control. In VM/SP 1.4 and SSX/VSE 1.4 this function is supported in the shut-down routine which orderly ends all system tasks and then powers-off the processor. In VSE/SP 2.1 a user interface is provided with which the user can program the power-off function.

## MAINTENANCE FACILITIES

**Remote Support Facility (RSF):** An IBM Customer Engineering tool provided by the Service Processor. Installation of the co-requisite communications interface is a no-charge customer option. RSF permits the IBM Customer Engineer, after customer authorization, to manually establish a connection to a RETAIN terminal at a remote IBM support location. Specialists can, from there, monitor and/or perform problem diagnosis on the 4361. This includes remotely initiated execution of diagnostic programs, remote examination of logout records from the system diskette facility, and remote exercise of the customer manual operations. RSF also allows the customer engineer to access the RETAIN data bank for the latest service aids and information from the customer site.

**Problem Finder Facility:** This is a function of the service processor. It provides the customer with detailed information about what to do in case of system malfunctions. It also contains procedures which enable the operator to diagnose and solve certain problems before calling for service. When customer engineering service is necessary, the customer reported error data allows the customer engineer to identify suspected FRUs remotely. This may eliminate

on-site analysis and wait time for required parts, resulting in reduced system outage time.

## Other Standard Functions:

- Multiple Virtual Storage capability by two-level Dynamic Address Translation in S/370 mode
- Single Virtual Storage by one level addressing in ECPS/VSE mode
- Channel Indirect Data Addressing in S/370 mode
- Channel Virtual Storage addressing in ECPS/VSE mode
- S/370 Universal Instruction Set
- Extended precision floating-point arithmetic
- Multiply-and-Add instruction (provided for compatibility purposes)
- Floating-point multiply accelerator (optional on model group 3)
- Support of the Start I/O Fast Release instruction with queueing (on model group 5 only)
- Clock Comparator and CPU Timer
- Time-of-Day Clock
- Interval Timer
- Machine Check Handling including Recovery Extension Feature
- Command retry on block multiplexer channels
- Move inverse instruction (not used by IBM programs)
- High-speed buffer storage (Cache): model group 3 and 4, 8Kb; model group 5, 16Kb

## STANDARD PROCESSOR FEATURES

The 4361 includes many 4331 features as standard. The table below, contains all 4361 model groups for comparison. 4331 feature numbers are provided for reference. The second part of the table lists the new 4361 features.

Feature	Equivalent 4331 Optional Feature	On Model Grp 3 4 5		
Adapter Power Prerequisite	#1001	S	S	S
Block Multiplexer Channel, 1st	#1421	O	S	S
Block Multiplexer Channel, Add'l	#1422	N	O	S
Byte Multiplexer Channel	#5248	O	O	S
Control Storage Expansion	#1901	S	S	S
Display/Printer Adapter Expansion	#2001	S	S	S
Diskette Drive	#3401	S	S	S
External Signals	#3898	S	S	S
Power Interface	#5531	S	S	S
Power Interface, Add'l	#5532	N	N	S
3340/44 Attachment (with DASD Adpt.)	#7851	N	S	S
DAS Compatibility (with DASD Adpt.)	#7901	N	S	S
ECPS/VM/370	#8701	S	S	S
ECPS/VSE		S	S	S
ECPS/MVS		N	N	N
New 4361 Features:				
Floating-Point Multiply Accelerator	N	Feature		
Auto Start	N	#1100	O	S S
Workstation Adapter	N	#1200	O	O O
EML Microcode Support	N	#2002	O	O O
High Accuracy Arithmetic Facility	N	---	I	N N
Serial non-IBM Interface	N	---	S	S S
Programmable Power-Off	N	---	S	S S

Legend:  
S Standard  
O Optional  
N Not available  
I Part of feature #1100 in model group 3

**Floating-Point Multiply Accelerator:** Standard on model groups 4 and 5, optional on model group 3. Executes frequently used floating-point multiply instructions in VSLI gate array hardware rather than in microcode, resulting in an improvement of execution speed for these instructions by a factor of three to eight. When this feature is installed in model group 3 (factory installation only), mathematical functions supported in the Elementary Math Library (EML PRPQ P81005, 5799-BTB) are assisted by microcode to improve performance. The EML PRPQ provides subroutines that can be called from VS Fortran in the VM/SP environment. The following functions are microcode assisted: square root, logarithm (ln, log), exponentiation, sine, cosine, arctangent, power.

**Block Multiplexer Channel:** Standard on model groups 4 and 5, optional on model group 3. Operates at up to 1.25M bytes/second for the attachment of tape units, system printers, displays and other non-DASD I/O via their control units.

**Byte Multiplexer Channel:** Standard on model group 5, optional on model groups 3 and 4. Operates at up to 26K bytes/second in single

byte-mode and 500K bytes/second in burst mode. It is primarily for the attachment of unbuffered card readers and MICR and OCR devices.

**Power Interface:** Provides power-on/off control from the 4361 Processor for control units/devices attached to 4361 channel and I/O adapters. Model groups 3 and 4 control for up to eight control units/devices, and the model group 5 for up to 16.

**External Signals:** Provides six external interrupt lines.

**Diskette Drive:** Compatible with the 3540 as a reader/recorder for Diskettes Type 1. It is required during system start-up for microcode loading and when the Problem Finder Facility is used.

**Display/Printer Adapter:** Attaches the 3205-1 color operator console, the 3278-2A operator console or the 3279-2C color operator console, and the following displays, printers and other devices:

3178-C1,C2	Display Station
3179-1	Color Display Station (3279-2A mode) except APL
3180-1 *	Display Station (3278-2 mode)
I 3191 Model A1X, B1X	Display Station
I 3192 Model C1X, C3X	
I D1X, D3X,	
I F1X, F3X	Display Station
3262-1,11	System Line Printer
3262-3, 13	Printer
3268-2,2C	Printer
3278-2	Display Station
3279-2A,S2A,02X	Color Display Station
3287-1,2,1C,2C	Printer
3289-4	System Line Printer
4224 model 2XX	Printer (Non-IPDS Mode)
4234 model 1	Dot Band Printer
4245-D12/D20	Printer (3262-3 Mode)
4250-1	Printer
5150 attached to	
a 3278/3279	3270 Personal Computer Attachment
5150/5160/5170	P/C with 3278/3279 Emulation Adapter
5160 with XT/370 Option Kit	Personal Computer XT/370
& 3278/79 Emulator Adapter	
(Ctrl Unit Term Mode only)	
5170 with AT/370 Option Kit	Personal Computer AT/370
& 3278/79 Emulator Adapter	
(Ctrl Unit Term Mode only)	
(Canada only)	
5160 model 589	Personal Computer XT/370
(Ctrl Unit Term Mode only)	
5170 model 599 and model 739	Personal Computer AT/370
(Ctrl Unit Term Mode only)	<)
5210-G1,G2	Printer
5271 all models	3270 Personal Computer (CUT mode only)
5273 all models	3270 Personal Computer AT (CUT mode only)
6150-20,25,A25	PC with 3278/3279 Emulation Adapter
6151-10	PC with 3278/3279 Emulation Adapter
6580-A4,A6,A8,A10	Displaywriter System
OEM devices	OEM subsystems and devices using SOEMI

\* The 3180-1 is supported only when it is emulating a 3278 model 2. The 3180 extended functions, APL and larger screen formats are not supported. See Workstation Adapter.

**Note:** See "Display/Printer Adapter" in Input/Output Attachments -- Additional Information section, and "Display/Printer and Workstation Adapter -- Additional Information" for more information.

## OPTIONAL FEATURES

Block Multiplexer Channel: Optional on model group 3.

**Auto Start:** With this feature the processor can be powered-on by telephone call via the Remote Operator Console Facility (ROCF) (here an external modem with autoanswer is required), or automatically at a predetermined time and day of the week. A 'Manual Operation' menu is provided at the operator console to preset the time and day of the week. Each day of the week may be associated with a different power-on time. The processor powers-on and proceeds with initial program load, sets the TOD clock from a battery-operated clock, and then IPLs the system. This automated system bring-up is supported by VSE/SP 2.1, SSX/VSE 1.4.0, and VM/SP 1.4. The bring-up sequence is also followed after an AC power outage upon return of power with option to suppress IPL to prevent uncontrolled restarts. IPL after an uncontrolled shut-down may need operator intervention.

An additional clock is implemented in the processor to sustain time and date during power-off periods. During normal power-off this clock is powered by an additional stand-by power supply. In case of a power outage or if the processor is disconnected from the power net, a battery with a life time of approximately four years supplies the clock. The battery can be changed while the system has power on or off without losing the time and date or without interfering with the system. This feature will be available for 4361s shipped from the beginning of April 1985. For field installation an MES will be available by October 1985. Field installation on 4361s shipped prior to April 1985 or 4361s upgraded from 4331s, require RPQ 7B0987 as prerequisite.

Floating-Point Multiply Accelerator: Optional on model group 3.

Byte Multiplexer Channel: Optional on model groups 3, 4.

## DASD/8809 ADAPTERS AND HIGH-SPEED CHANNELS

Integrated DASD/8809 adapters and high-speed BMPX channels are available to attach high performance DASD, tapes, and other I/O devices. These adapters and channels are available in several combinations to provide the I/O configurations required to support a range of programming systems and customer environments.

**DASD/8809 Adapters:** Operate at up to 1.86M bytes/second for the attachment and control of 3310, 3370, and 3340/44 DASD or the 8809 Magnetic Tape Unit. The 3310 and 3370 operate in fixed-block data format and provide emulation of Count-Key-Data (CKD) data formats. Restrictions on model group 3: The 3340/44 attachment and CKD emulation (DASD Compatibility) is not supported. 8809 attachment is limited to the second adapter.

**High-Speed BMPX Channel:** On model group 3 one operates at up to 1.86M bytes/second. On model groups 4 and 5 two are included which operate at up to 3M bytes/second for the attachment of the 3880/3380 DASD. On model groups 4 and 5, a third operates at up to 1.86M bytes/second. Attachment of 231X, 333X, 334X, 3350, and 337X DASD, and other I/O devices via control units is supported.

**Workstation Adapter:** Provides 32 ports via 3299 Terminal Multiplexers to attach the following devices and workstations. When installed, the number of ports on the DPA reduces to eight. Prerequisites: Each group of eight ports requires one 3299-1.

3178-C1, C2 (Canada only) 3178-C30, C40	Display Station
3179-1	Display Station, US English, refer to Specify section, #9261<
3180-1	Color Display Station (3279-2B mode) except APL
3191 Model A1X, B1X, D1X	Display Station - 3278-2, 3, 4, 5 mode plus APL on model 13X
3192 Model C1X, C3X	Display Station
D1X, D3X, F1X, F3X	Display Station
3278-2, 3, 4, 5	Display Station
3279-2A, 3A, 2B, 3B	
S2A, S2B, S3G, O2X, O3X	Color Display Station
3262-3, 13	Printer
3268-2, 2C	Printer
3287-1, 2, 1C, 2C	Printer
4224 model 2XX	Printer (#9261 req'd on 4361 for IPDS Mode)
4234-1	Printer
4245-D12, D20	Printer (3262-3 Mode)
4245-D12, D20 (#9160)	System Line Printer
4250-1	Printer
5150 attached to 3278/3279	3270 Personal Computer Attachment
5150/5160/5170	PC with 3278/3279 Emulation Adapter
5160 with XT/370 Option Kit & 3278/79 Emulation Adapter (Ctrl Unit Term Mode Only)	Personal Computer XT/370
5170 with AT/370 Option Kit & 3278/79 Emulation Adapter (Ctrl Unit Term Mode only)	Personal Computer AT/370
(Canada only) 5160 model 589	Personal Computer XT/370
(Ctrl Unit Term Mode only)	
5170 model 599 and model 739	Personal Computer AT/370
(Ctrl Unit Term Mode only)	<
5210-G1, G2	Printer
5271 all models	3270 Personal Computer
5273 all models	3270 PC/AT
5371 all models	3270 PC/G, PC/GX
5373 all models	PC AT/G, PC AT/GX

5550  
6150-20,25,A25  
6151-10  
6580 all models  
OEM devices

Japanese PC  
PC with 3278/3279 Emulation Adapter  
PC with 3278/3279 Emulation Adapter  
Displaywriter System  
OEM subsystems and devices using SOEMI

**Communications Adapter:** Attaches up to eight communication lines with an aggregate data rate of 64K bps. BSC, SDLC, HDLC (LAPB) for X.25 lines, and Start/Stop transmission modes are supported and can be intermixed. In Start/Stop mode, IBM TC1 and TWX/TTT2 devices are supported, with connection via the EIA RS-232-C interface.

**Additional Optional Features:** Include most of those available on the 4331 Processors. Exceptions are the 5424 Adapter, 1400 Compatibility, integrated modems for the communications adapter, and the R-Loop. On model group 3, DASD compatibility is also not available.

## INPUT/OUTPUT ATTACHMENTS - ADDITIONAL INFORMATION

**External Signals:** External devices must meet the interface specifications outlined in S/360 Direct-Control Feature OEMI (GA22-6845).

**Byte Multiplexer Channel:** Functionally equivalent to the byte multiplexer channel on S/360 and S/370 and provides eight control unit positions. The channel permits simultaneous operations of low-speed devices. See "IBM 4361 Channel Characteristics" (GA33-1567) for devices which may be attached.

**Channel Address and Subchannels:** The Byte Multiplexer Channel, the Display/Printer Adapter and the Communications Adapter are addressed via channel 0. From the 256 subchannel addresses of channel 0, up to 24 are assigned to the Display/Printer Adapter. 8, 16 or 24 addresses are used by the DPA, the range is variable. If the WSA is installed, 64 addresses are reserved for the WSA with a fixed address range of 40-7F. If the CA is installed, 16 addresses are reserved for the CA with a fixed address range of 30-3F. The subchannels remaining for the Byte Multiplexer Channel can be configured at installation time as non-shared or shared subchannels, the latter each with devices in multiples of eight, up to a maximum of 248 devices.

**Block Multiplexer Channel:** Each provides eight control unit positions. The block multiplexer channels permit simultaneous operation of high-speed devices. The ability to Block Multiplex and the facility for multiple requesting allow several I/O units to operate concurrently with greater channel efficiency. Devices attached to these channels that cannot utilize block multiplexing will function as if attached to selector channels. See Table 3 and IBM 4361 Channel Characteristics (GA33-1567), for details or use HONE aid ANCHLOAD.

**Channel Address and Subchannels:** Channel addresses may be selected at installation time from the range of one to six. Subchannels can be configured at installation time with up to 256 non-shared or shared subchannels, the latter each with devices in multiples of eight, up to a total of 256 devices.

**DASD/8809 Adapter:** DASD/8809 Adapters provide attachment of 3340/3344 (on model groups 4 and 5 only), 3310 and 3370 Direct Access Storage Devices or 8809 Magnetic Tape Units without the necessity of a control unit. Attachment of DASD and of 8809 units on one adapter is mutually exclusive. The configuration is selected at system installation time.

**DASD attachment:** Up to four strings of devices may be attached to the adapter. The attachable device types may be intermixed on the adapter but not within a string. The channel address may be from one to six. Addresses for up to four strings of 3310 and 3370 can be configured at installation time in the range from X0X to X7X. 3340/3344 devices attaching to the DASD Adapter have logical unit/device addresses as follows:

X00	01	02	03	04	05	06	07
	2A	2B	2C	2D	2E	2F	

	4A	4B	4C	4D	4E	4F
	6A	6B	6C	6D	6E	6F

and

X10	11	12	13	14	15	16	17
	3A	3B	3C	3D	3E	3F	
	5A	5B	5C	5D	5E	5F	
	7A	7B	7C	7D	7E	7F	

**String Switch Capability:** Allows sharing of 3340-A2 and/or 3370-A1/A2 and associated drives with another IBM processor or control unit that supports the DASD and string switching. It provides the ability for strings of 3340/3344 or 3370 to be accessed from DASD adapters or control units on the same or two different processors. The 3340-A2 or 3370-A1/A2 must have the String Switch (#8150) installed. String switch support of 3340/3344 is limited to the static assignment of a shared string to one processor at a time.

**S/3 Data Import:** With the VSE/3340 Data Import utility program product (5746-AM3), 3348 Data modules that have been written on a S/3-3340 can be read on any directly attached 3340 drive.

**Direct Access Storage Compatibility:** (Standard on model groups 4 and 5 when a DASD/8809 adapter is installed, not available on model group 3). Designed primarily as a conversion aid, this feature provides emulation of 231X data formats on 3310 or 3370 Direct Access Storage and emulation of 3330 (100Mb volume) or 3340 (70Mb volume) formats on 3370 Direct Access Storage. This allows programs written for use with 231X, 3330 or 3340/3344 DASD to be executed with only Job Control modifications. DAS Compatibility can be used on 3310 or 3370 devices which are installed on one DASD adapter on up to two consecutively addressed strings. Any one compatibility type can be activated at IPL time. Operates under DOS/VSE, OS/VS1 or VM/370, is not supported by MVS.

**Data sets in fixed-block format and in emulated format can reside on the same 3310/3370 volume. A variable number of full or partial CKD volumes can be stored on the 3310 or 3370 up to the capacity of the host device, in case of 3370 models A2/B2 up to the capacity of 3370 models A1/B1. Residual space can be used in fixed-block format. However, access to one format only can be selected at IPL time. Each full or partial emulated volume begins on a predefined full-volume boundary. With OS/VS1 or VM/370 partial emulated volumes are not supported. For mapping of emulated volumes onto 3310/3370 volumes and for device address assignment refer to "IBM 4361 Direct Access Storage Compatibility" (GA33-1569).**

**Performance:** Use of DAS Compatibility or 3340 direct attachment introduces additional channel demands and can have an effect on system performance, particularly in environments with high I/O load on emulated DASD. Batch job execution elapsed times may increase. Exclusive use of DASD emulation is not recommended in any SCP environment. Limitations: (1) Not supported on model group 3. (2) Operates on up to two consecutively addressed strings of 3310 or 3370 attached to the DASD adapter. (3) Direct attachment of 3340/3344 is limited to two strings on the system. (4) One type of emulation can be activated at IPL time. (5) 3330-11 cannot be emulated. (6) Emulation cannot be used on 3370 drives which are shared via string switch. (7) VM/370 supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system, other than VM/370 or CMS. Emulated 2311 is not supported by VM/370. (8) OS/VS1 does not support 2311, native or emulated. (9) MVS does not support DAS compatibility. Program Order: The required utility programs for initialization and surface analysis of the 3310/3370 DASD as well as the formatting of the emulator extent are included in the VSE SCP, 5745-030 or VSE/AF or combined with VSE/SIPO/E products. OS/VS1 (5741-VS1), VM/370 (5749-010) and VM/SP contain the Device Support Facilities for initialization and surface analysis of CKD DASD. In addition, for the required formatting of the emulator extent, order 5747-SA1. The stand-alone Device

Support Facilities can also be ordered separately with program order number 5747-DS1.

**8809 Magnetic Tape Unit attachment:** 8809-1A and up to five additional 8809 tape units (consisting of a mix of 8809-2s and 3s) may be attached. Allows the 8809 Magnetic Tape Unit to operate in streaming mode (data rate is up to 160K bytes per second) for dedicated loading or off-loading DASD devices. Because streaming mode may not be sustained, the 3340/3344 should not be used with the 8809 in that mode. Can operate in start/stop mode (data rate is up to 20K bytes per second) for other data processing operations. Although physical Read-Backward commands are not supported, the Read-Backward operation is simulated in the Logical IOCS (MTMOD) of VSE. Channel and device addresses may be assigned at system installation time from the range of X00 to X05, where X is one to six.

**Display/Printer Adapter:** In addition to the console device up to 15 (seven when the Workstation Adapter is installed) of the devices attachable may be installed in any combination. All terminals attached to the Display Printer Adapter can be driven at distances up to 610m (2,000 ft.) using the IBM Cabling System or 1,500m (4,920 ft.) using coaxial cable. No more than two 3262 and/or 3289 printers and/or 4245-D12 or one 4245-D20 can be included. The 3262 or the 3289 may be used as system printers only, depending upon control program or program product support. One terminal printer may be used as a console hardcopy device. Other terminal printers may be used for local copy operation in shared mode only. Print files may be interrupted by local copy output. The remaining ports may be used for attachment of displays, printers and workstations for user-written applications. Display/Printer Adapter support includes all standard functions of the 3274-1B with the respective terminal devices attached. In addition, the following 3278/3279 special features are supported: Keyboard Numeric Lock, Audible Alarm (standard on the 3279), Security Keylock and Switched Control Unit. Other 3278/3279 special features are not supported. 3278 or 3279 Display Station keyboard feature codes #4621, #4622, #4623, #4627, #2715, #2716, #2717 and the model C1 and C2 keyboards of the 3178 and the 122 key (Japan only) > (or 124 key for Japanese Katakana) < keyboards of the 3179 Display Station and the 3180 Display Station models 11X, 12X, and 13X (except in APL mode) are supported. If two different keyboards are required for 3278/3279s, one must be #4621(Japan only) > or #2715 <).

**Workstation Adapter:** The Workstation Adapter (WSA) supports almost all features/ function of the Display/ Printer Adapter (DPA), except e.g.: 3205, 3262-1,11, 1052 mode, Data Entry/ Keypunch (#4623). Beyond the Display/ Printer Adapter capability following features/functions are supported: 3270 Extended Datastream for extended highlighting, seven colors and programmed symbols, screen sizes up to 3,564 characters, Distributed Function Terminal (DFT) mode and 3278/3279 APL keyboard. When the WSA is installed, the number of ports on the Display/Printer Adapter is reduced from 16 to 8. However, the additional number of ports available with the WSA installed is 32, requiring one 3299-1 Terminal Multiplexer for each group of eight ports. This provides a total of 40 ports on the DPA and WSA together. The functional level of the eight DPA ports remains unchanged. The 3179 and 3180 Display Station are supported in 3278/3279 emulation mode. The 4245-D12/D20 printers are supported on the WSA as terminal printers or as system printers. A maximum of three 4245-D12 or two 4245-D20 may be installed. If used as system printer, then specify feature #9160 is required on the 4245-D12/D20, and specify feature #9261 is required on the 4361 Processors shipped until March 1986.

3262-1/11 and 3289 printers are not supported on the WSA. The multiple logical terminal facility of the 3270 PC allows the user to designate up to four terminal addresses in a single 3270 PC. This requires one physical and up to four logical addresses for one physical port on the WSA. When planning installation of the 3270 PC, considerations must be given to the number of logical and physical addresses that are to be used compared to the maximum number of addresses (63) and ports (32) that are available on the WSA.

**Serial non-IBM Interface (SOEMI):** This interface can be used to attach a variety of non-IBM subsystems and devices to the DPA/WSA. A protocol based on structured fields is implemented in microcode

and can be used by standard S/370 I/O instructions, providing the user full programming flexibility. OEM adapters are required to attach the subsystems and devices to the SOEMI in order to provide the appropriate conversions and control functions. Examples are the attachment of subsystems based on board-level microcomputer devices using non-IBM standards, e.g., IEEE-796. The DPA supports up to two SOEMI adapters with an aggregate data rate of up to 17K bytes per second (inbound) or 30K bytes per second (outbound). The WSA supports up to four SOEMI adapters with an aggregate data rate of up to 22K bytes per second (inbound) or 45K bytes per second (outbound). These are the maximum rates that may be impacted by other processes in the 4361 Processor, in particular on the DPA/WSA. Prerequisites: 4361 EC-Level 364435. Limitations: On the DPA SOEMI support is exclusive with 3279 terminal support for Katakana, Canadian-French, and 1052 operator console emulation support.

#### DISPLAY/PRINTER AND WORKSTATION ADAPTERS-ADDITIONAL INFORMATION

Channel 0 addresses for these devices are assigned at installation time. The 3179 and the 3180 displays are supported in 3278/3279 emulation mode. The 3268 and the 5210 printer are supported as 3287.

Cable Order: See machine pages of the device to be attached for ordering information for the required cable.

**Keyboard/Character Set Language:** The keyboard/character set language for devices attached to the Display/Printer Adapter or to the Workstation Adapter is selected at installation time of the machine or the device via a manual operation. It must correspond to the keyboard/character set language ordered for the device. A commonly used language/keyboard combination is pre-selected when the machine is shipped. On the DPA, one or two language/keyboard combinations are supported as follows:

a) One language chosen from Table 1 is used on the 3205-1, the 3278-2A or the 3279-2C operator console and can also be used on displays with typewriter keyboards and on terminal printers.

b) In addition to selection (a), displays with one Data Entry Keyboard type, using the same or optionally a second language from table 1, 3278/3279 keyboard feature Data Entry (#4622), #2716 or Data Entry, Keypunch-Layout (#4623) are supported. The 3178 model C1 and the 3180 model 12X are compatible with 3278 with #4622.

#### Notes:

Support for Data Entry/Keypunch-Layout Keyboard (#4623) should not be ordered because of diminishing usage. Do not plan its use in future applications. It is not supported on the Workstation Adapter.

Data Entry Keyboard cannot be specified for display workstations if Katakana is to be used on both the operator console and the workstations.

(c) Alternatively to selection (b) in addition to selection (a), displays with typewriter keyboard using a second language from Table 1. 3278/3279 keyboard features #4621, #4627, #2715 or #2717 are supported. The 3178 model C2 and the 3180 model 11X are compatible with 3278 with #4627.

On the Workstation Adapter, one keyboard language can be selected. In conjunction with the language, one of the following Typewriter keyboard layouts is selectable:

- Typewriter layout (standard, with or without APL)
- Typewriter layout 3178-C30
- Typewriter layout 3178-C40
- Typewriter layout 3178-C80

Additionally as standard function Data Entry keyboard layout is available.

Table 1 - Keyboard Language/Character Set Language

ASCII (3)	English US
Brazil (2, 3)	International (2,3)
Canadian Bilingual (WSA only)	Japanese English (2,3)
Canadian French (1)	Japanese Katakana (4)
Cyrillic (3)	Spanish Speaking
(3278/3279 mode only)	
EBCDIC (2, 3)	

Notes:

1. Not supported for 3278-2A and 3279-2C operator consoles.
2. Not available on 3180.
3. Not supported by 3205-1 operator console.
4. (Japan only) For Katakana on the operator console order, Keyboard #2720, character set #2773, and keyboard language #2973 on the 3278-2A or on the 3279-2C. If the 3278-2 or 3279-2A Display Stations installed on the Display/Printer Adapter are also to be installed with Katakana, they must have typewriter keyboard #2715 or #2717; a 3180 model 1 must have #4600 with Katakana.<)

**Diskette Drive:** Diskette data capacity is 242,944 bytes organized in 1,898 sectors of 128 bytes each (Diskette Type 1). When used with VSE refer to VSE/POWER documentation. Recorded Data can be interchanged with IBM devices and systems which have a diskette drive. Examples are the 3740, 3770, 3790, 5280, 8100, S/1, S/3, S/32, S/34, and S/38. The diskette drive is temporarily used as input device for Initial Microcode Load (IML) and when the Problem Finder Facility is used. Limitations: Support by VM/370 via IUP only. Device address on channel 0 is selected at installation time.

**Minimum Configuration:** The minimum system configuration consists of:

- A 4361 processor.
- One operator console. The operator console must be positioned for maintenance so that screen displays are legible for a CE working on the processor. If the operator console cannot

be positioned at the processor during maintenance, an additional operator console is required. If the operator console is a 3278 model 2A or a 3279 model 2C, a chargeable RPQ (for the cable extension) is required to allow remote installation.

- One High-Speed BMPX Channel (#1431) or one DASD/8809 Adapter (#3201)
- One system printer.
- The following additional requirement applies only to those systems where OLTs (Online Tests) are needed for I/O maintenance: Access to one Tape/DASD combination from Table A or Table B or any other means to generate the OLTs. (The Tape/DASD configurations are required for the generation and maintenance of the OLTs.)

Table A - Systems With Removable Disk Packs or No DASD

Combination	a)	or	b)	or	c)
DASD plus	2		1		0
Tape Units	0		2		3

Table B - Systems With Only Non-Removable Disk Packs

The amount of tapes required to generate OLTs depends on the operating system type and release level:

DOS/VSE AF Release 1.3.5, SSX/VSE Release 1.3.0 (or Higher Releases)	Any other operating system
-------------------------------------------------------------------------------	----------------------------------

Tape	1	3
------	---	---

**Maximum Configuration:** The maximum number of channels and integrated adapters which can be installed are shown below with associated feature numbers. Your configuration should correspond to one column or be a subset of it. Either High-Speed BMPX Channel (#1431) or DASD/8809 Adapter (#3201) must be installed.

Table 2 - Maximum Configurations

TABLE 2 -- MAXIMUM CONFIGURATIONS

CHANNEL/ADAPTER CONFIGURATION OPTION	MDL GRP 3				
	C1D1	D			
Byte MPX Channel	5248	5248			
Block MPX Channel 1st	1421	1421			
Block MPX Channel 2nd	-	-			
High-Speed BMPX Channel 1	1431	-			
High-Speed BMPX Channel 2	-	-			
High-Speed BMPX Channel 3	-	-			
DASD/8809 Adapter 1*	3201	3201			
DASD/8809 Adapter 2	-	3202			
DASD/8809 Adapter 3	-	-			
DASD/8809 Adapter 4	-	-			

CHANNEL/ADPATER CONFIGURATION OPTION	MDL GRP 4			
	C	C2D1	C1D2	D
Byte MPX Channel	5248	5248	5248	5248
Block MPX Channel 1st	S	S	S	S
Block MPX Channel 2nd	1422	1422	1422	1422
High-Speed BMPX Channel 1	1431	1431	1431	-
High-Speed BMPX Channel 2	1432	1432	-	-
High-Speed BMPX Channel 3	1433	-	-	-
DASD/8809 Adapter 1*	-	3201	3201	3201
DASD/8809 Adapter 2	-	-	3202	3202
DASD/8809 Adapter 3	-	-	-	3203
DASD/8809 Adapter 4	-	-	-	3204

CHANNEL/ADAPTER CONFIGURATION OPTION		C	MDL GRP 5 C2D1	C1D2	D
Byte	MPX Channel	S	S	S	S
Block	MPX Channel 1st	S	S	S	S
Block	MPX Channel 2nd	S	S	S	S
High-Speed	BMPX Channel 1	1431	1431	1431	-
High-Speed	BMPX Channel 2	1432	1432	-	-
High-Speed	BMPX Channel 3	1433	-	-	-
DASD/8809	Adapter 1*	-	3201	3201	3201
DASD/8809	Adapter 2	-	-	3202	3202
DASD/8809	Adapter 3	-	-	-	3203
DASD/8809	Adapter 4	-	-	-	3204

Legend:

- S Standard
  - \* In Model Grp 3 for DASD only
  - Not available
  - C Channel configuration
  - D DASD/8809 adapter configuration
- Example C1D2 = one channel, two DASD adapters

**Channel/Adapter Load Evaluation:** All data passing through the system for any I/O device interferes with the data flow for other devices, producing I/O limitations. The limitations take two forms:

- Hardware exclusivities listed in the feature descriptions.
- I/O attachments that individually or in combination can produce frequent data overruns. Considerations in this category are:

The number of and the aggregate data rate of the Block Multiplexer Channels and the DASD/8809 Adapters.

The number and speed of lines attached to the Communications Adapter.

The number and class of over-runable devices on the Byte Multiplexer Channel.

Refer to Tables 3, 4 and 5 below to properly configure a 4361. If your configuration is within the limits of the examples shown no further validation is required. For model upgrades valid configurations of the 4331-2 or 4361-3 including channels, adapters and communications lines, are valid for a 4361-4 or 5. If additional channels/adapters/lines are to be installed, the limitations below should be observed.

**Table 3 - Allowable Data Rates**

ALLOWABLE DATA RATES									
Maximum Data Rate (Mbyte/sec)									
Configuration		Block Mpx		High-Speed BMpx			DASD/8809 Adapter		
Model	Grp	1	2	1	2	3	1	2	3 4
D1	3,4,5	1.25	1.25	-	-	-	1.86	-	-
D2	3,4,5	1.25	1.25	-	-	-	1.86	1.86	-
D3	4,5	0.50	1.25	-	-	-	1.86	1.86	1.86
D4	4,5	0.50	0.50	-	-	-	1.86	1.86	1.86 1.86
C1D2a	4,5	Class 3	1.25	3.00	-	-	1.86	1.86	-
C1D2b	4,5	0.50	1.25	1.86	-	-	1.86	1.86	-
C1D1	3	1.25	-	1.86	-	-	1.86	-	-
C2D1a	4,5	Class 3	1.25	3.00	3.00	-	1.86	-	-
C2D1b	4,5	0.50	1.25	1.86	3.00	-	1.86	-	-
C1	3	1.25	-	1.86	-	-	-	-	-
C2	4,5	1.25	1.25	3.00	3.00	-	-	-	-
C3a	4,5	Class 3	1.25	3.00	3.00	1.50	-	-	-
C3b	4,5	0.50	1.25	1.86	3.00	1.86	-	-	-

Notes:

- See Table 4 below for number and speed of lines concurrently operable on the communications adapter together with unbuffered devices (example 2501) attached to the Byte Multiplexer Channel.
- If multiple Class 1 devices are to be operated concurrently on the Byte Multiplexer Channel, consult IBM 4361 Channel Characteristics (GA33-1567), or use HONE aid ANCHLOAD.
- For data rates and recommended attachment of commonly used devices refer to Table 5 below.
- Second BMPX channel is not available on model group 3.

- For IBM 3480 Magnetic Tape Unit data rates, refer to Table 5, note 1.

**Table 4 - Allowable Number Of Communication Lines**

With Line Speed Up To 9600 bps

Configuration	Single Device on Byte Mpx Channel			
	None	2501	1442	1419
D1	8	8	8	8
D2, D3, C1D1	8	8	8	7
D4, C1D2	8	8	8	6

C2, C2D1	8	8	6	3
C3	8	5	4	1

## PROGRAMMING SUPPORT

**Note:** Lines of different speed may be mixed. Maximum number of lines is eight. Aggregate data rate of 64K bps may not be exceeded. Each X.25 line, because of full-duplex operation, contributes twice the single line speed to the aggregate data rate. For configurations with line speed higher than 9600 bps refer to IBM 4361 Channel Characteristics (GA33-1567), or use HONE aid ANCHLOAD. Line configurations which exceed the load maximum may be installed, however, they should only be operated concurrently within an allowable configuration.

Table 5 - Data Rates and Recommended Attachment

of Selected I/O Devices			
Device	Data Rate (Mb/sec.ec)	Recommended Attachment in Sequence of Preference	
3310	1.030	da	
3370	1.860	da	hb
3375	1.860	hb	
3380	3.000	hb12	
3330	0.805	hb	
3340/3344	0.885	hb	da
3350	1.200	hb	
3411	0.080	b2	Bu
3420-7	0.320	b2	b Bu
3420-4	0.470	b2	b
3420-8	1.250	b2	b
3430	0.312	b2	b Bu
3480	note 1	hb12	hb b
3272/3274	Class 3	b1	b Bu
3203-5,2821	Class 3	b1	b Bu
3262-5	Class 3	b1	b Bu
4245-12/20	Class 3	b1	b Bu
3705 NCP	Class 3	b1	b Bu
3705 EP,2701	Class 2	By	
2501,1442	Class 1	By	b2(s)
1419	Class 1	By	
3720 NCP	Class 3	b1	b Bu
3725 NCP	Class 3	b1	b Bu
3720 EP	Class 2	By	
3725 EP	Class 2	By	

### Legend:

- Class 1 - unbuffered device, manual recovery from overrun
- Class 2 - unbuffered device, programmed recovery
- Class 3 - buffered device, operates at channel speed
- da - attach to a DASD/8809 adapter
- b - attach to any Block MPX channel
- b1 - attach to Block MPX channel 1
- b2(s) - attach to BMPX channel 2 as single device
- hb - attach to any High-Speed BMPX channel
- hb12 - attach to HS-BMPX channel 1 or 2
- Bu - attach to Byte MPX channel in burst mode, may not operate concurrent with Class 1 or Class 2 devices
- By - attach to Byte MPX channel in byte mode

Note 1: The 3480 Magnetic Tape Unit data rates: In DC Interlock mode: Operates with channel speed (up to 1.25Mb/sec.) on any Block MPX or High-Speed Block MPX. In Streaming mode: On model group 3 can operate on High-Speed Block MPX #1 at 2.0Mb/sec.. On model group 4 and 5 can operate on High-Speed Block MPX #1 and #2 at 3.0Mb/sec. or 2.0Mb/sec., on #3 at 2.0Mb/sec.. If High-Speed Block MPX #1 operates I/O with more than 2.0Mb/sec., then on High-Speed Block MPX #3, the 3480 can only operate in DC Interlock mode at channel speed (refer to "IBM 4361 Channel Characteristics", GA33-1567).

The 4361 Processors implement new machine and channel checking techniques which significantly increase recovery capabilities, reduce downtime and allow increased deferred maintenance. The 4361 model group 5 supports the Start I/O Fast Release instruction with queuing of I/O requests. This can improve performance by up to 20 percent in commercial workloads with high input/output activity. 4361 Processors are supported by the following IBM programming releases (and later releases, unless otherwise indicated):

### Model Groups 3, 4, and 5 Support (2Mb to 12Mb):

- VSE/System Package 2.1.0 with the appropriate SPEs installed, or VSE/Advanced Functions 2.1.0 with the appropriate SPEs installed, in all modes (ECPS/VSE or S/370 modes, and as a guest under VM).
- VSE/System Package 1.1.0 (VSE/SIPO/E 1.4.0), or VSE Advanced Functions 1.3.5, with the appropriate SPE installed, in all modes. Load leveling for the model group 3 is done as for a model group 4 or 5.
- SSX/VSE 1.4.0, in ECPS/VSE mode, and as a guest under VM.
- SSX/VSE 1.3.0, with the appropriate SPEs installed in ECPS/VSE mode, and as a guest under VM. Load leveling for the model group 3 is done as for a model group 4 or 5.
- VM/System Product Release 3 with SPEs installed, or VM/System Product Release 4.
- Model Groups 4 and 5 (16Mb) Support: Supported by current release of VM/SP, VSE/SP in 4361 ECPS: VSE mode and, on model group 5, MVS/SP. For VSE/SP when running the 4361 in S/370 mode, Version 2.1.1 or later releases are required.

### Model Group 5 Additional Support:

- MVS Release 3.8 with MVS/SP-JES2 1.3.0 (5740-XY5) and MVS/SP-JES3 1.3.0 (5740-XYN). ECPS/MVS must be activated. Operation as a guest under VM is supported and assisted. MVS does not support the integrated communication adapter or the DASD/8809 adapter.

OS/VS1 Release 7 with OS/VS1/Basic Programming Extensions Release 4 supports the 4361 Processors. The Start I/O Fast Release instruction and the enhanced recovery capabilities of the 4361 are not supported in OS/VS1. At start-up of the system (at IPL time), the 4361 Processors can be conditioned to be viewed by the operating system as a 4331-2. Previous releases of VSE, SSX/VSE, and VM, as well as OS/VS1, which do not recognize the 4361 Processors, can then be used. This additional programming support will ease migration to the 4361 Processors for customers coming from a 4331 with one of the following release installed:

- VSE/SIPO/E 1.2.1 or 1.3.1, and releases with VSE/Advanced Functions 1.2.0 or 1.3.0 as a base, in ECPS/VSE or S/370 mode, including as a guest under VM.
- VSE/Advanced Functions 1.2.0 or 1.3.0, in ECPS/VSE or S/370 mode.
- SSX/VSE Release 1.2.0 or 1.3.0 in ECPS/VSE mode, including as a guest under VM.
- VM/System Product Release 2 or Release 3 without the SPE supporting the 4361.
- OS/VS1 Release 7, with or without OS/VS1/Basic Programming Extensions, including as a guest SCP under VM.

Customers who install the 4361 processor with a VSE, SSX/VSE, or VM release supporting the 4361 as a 4331 should plan to subsequently migrate to the latest release in order to gain the benefits of enhanced recovery. Customers who install with OS/VS1 Release 7 can achieve better utilization of a 4361 model group 5 by migrating to MVS/SP.

### Additional Comments:

- VSE releases prior to VSE/AF 2.1.0 and VSE/SP 2.1.0 in S/370 mode will not operate on the 12Mb models unless VSE is a guest under VM. When the VM linkage enhancements are generated in the VSE system, it can then fully utilize a 12Mb configuration.
- Under VSE, basic support for attachment of X.21 switched lines to the Communications Adapter will be available in ACF/VTAM 2.1.
- OS/VS1 will operate on the 12Mb models, but the SCP will only access up to 8Mb. When OS/VS1 is a guest SCP under VM, and the VM handshaking feature is generated, an OS/VS1 system can fully utilize the 12Mb storage.
- Support for the 4361 in VM/SP Release 3 can be installed with an SPE.
- Support for the 4361 model group 5 in MVS/SP 1.3.0 and later can be installed with PTF UZ90274 via SMP.

**ECPS/VM/370:** The 4361 Processor provides ECPS/VM/370 support at Level 20, compatible with VM/SP Release 2. The functional areas assisted include: Virtual Machine I/O, SVC Handler, Privileged Instruction emulation, and Virtual Interval Timer. Whenever ECPS/VM/370 and ECPS/VSE are both selected at IPL time, ECPS/VM/370 is enhanced to include the functions of the Shadow-Table Bypass Assist defined in Virtual Machine Assist and Shadow-Table-Bypass Assist (GA22-7074). These functions enhance the performance of MVS running under VM/370 in a V=R environment with VM/System Product.

**ECPS/MVS:** The 4361 Processor model group 5 provides the privileged instructions required by MVS/System Product - JES2 (5740-XY5) and MVS/System Product - JES3 (5740-XYN). These instructions involve the following MVS functional areas:

- SVC Interrupt Handling
- Integrity
- Tracing
- Lock Management
- Real Storage Management

## SPECIFY

**Note:** Specifications and no-charge options are for plant installation only, unless otherwise indicated.

- Power:

AC, 1-phase, 3-wire, 60 Hz:  
200V #2732      208V #9902  
220V #2803      240V #9914

- AC, 1-phase, 3-wire, 50 Hz: Meets Japanese current-leakage requirements.

200V #2806      220V #2813  
230V #2821      240V #2801

- Color: #9065 for pebble gray, #9061 for garnet rose, #9063 for classic blue, #9060 for willow green, #9064 for charcoal brown, #9062 for sunrise yellow.

- Operator Console: #9325 for 3205-1 operator console; #9327 for 3278-2A or 3279-2C operator console.

- Machine Nomenclature:

Japanese      #2930  
Portuguese (Brazil)      #2933  
Spanish Speaking      #2931

- (Canada only>In Quebec: Specify #2935 for Canadian French, #2934 for English.<)

**Note:** Specification of nomenclature is optional. The default language is determined by the country code. Default language for countries not shown above is English.

- Specify Feature #9261 is a composite of various new enhancements to the Display Printer Adapter and Workstation Adapter. It is required on 4361 Processors shipped until March, 1986. Subsequent to March, 1986, the function of #9261 will be standard.

- 4234 model 1 Printer Attachment: Specify #9261 on the 4361.

- Remote Support Facility (RSF) and Remote Operator Console Facility (ROCF): Consist of functions provided by the Service Processor and includes a communications interface. They are recommended to be ordered for initial shipment but can also be installed in the field.

The Remote Support Facility is a customer engineering tool. Its use is recommended. RSF permits the customer engineer, after customer authorization, to manually establish a connection to a RETAIN terminal at a remote IBM support location, and from there monitor and/or perform problem diagnosis on the 4361.

The Remote Operator Console Facility is an extension of RSF. It enables an operator at a host location to IML/IPL and execute other manual control functions for a remote 4361 via a 3275 display station, or via a 3275 emulated on a host attached 3270 or emulated on an IBM Personal Computer (for details see note below). After IML and IPL is complete the remote operator console can be disconnected and the remote 4361 can be operated in stand-alone mode, or control can be turned over to existing networking facilities.

**Prerequisites:** For use of RSF and/or ROCF. RSF/ROCF are ordered via a no-charge specification. The customer must provide the telephone line and arrange for the connection of the telephone interface cable provided by IBM to the telephone network. When an external modem is required it must be provided by the customer. For use with ROCF it must include auto-answer. RSF operates in manual answer mode. For details on ordering and customer responsibilities, see Systems and Procedure Manual.

**Note:** On the 3275 (for 1200 bps only), Integrated Modem #5501 and Dial #3440 must be installed. The 3275 Display Terminal can only be obtained on an "as available" basis. The following alternatives are available:

IBM PC with 128Kb memory, 160Kb diskette drive, BSC communication adapter, adapter cable and the BSC 3270 emulation licensed program (external modem is required). For transmission speed see specify codes for the 4361.

3275 Emulation via microcode on a 4361 (using the operator console) or, using a 3270 terminal for remote control (which is part of the host operating system; MVS/OCCF 5665-288 or VM pass through facility 5748-RC1).

Specify one to provide RSF and/or ROCF:

(Canada only>Specify #9514 as the preferred RSF/ROCF feature. It avoids the need for external modems or external protective couplers and can be used for both RSF and ROCF. It provides integrated modem, 1200 bps, switched network, manual or auto-answer. A telephone set with exclusion key and a RJ41S or RJ45S type data jack is required. A FCC registered protective coupler is included. Ringer Equivalence Number (REN) is 0.8B.

Specify #9517 for ROCF connection for 4800 bps attachment to external modem for switched networks with clocking and auto-answer via EIA RS-232-C interface.

Keep specify #9511 (for use with RSF and/or ROCF) on an installed 4331 to be upgraded to a 4361 for EIA RS-232-C interface, 1200 bps, switched network. An FCC registered external modem, compatible with the WE202S modem or equivalent, is required. For ROCF the modem must include auto-answer.

Keep specify #9510 (for use with RSF only) on an installed 4331 to be upgraded to a 4361 which provides integrated

modem, 1200 bps, switched network, manual answer. A telephone with FCC registered Data Access Arrangement (DAA) compatible with CDT Coupler Series 1000A interface and operation, with a 4-prong jack, is required. <)

(Except Canada, Japan and Hong Kong > Specify #2836 for RSF/ROCF connection via integrated modem, 1200 bps, switched network, manual or auto-answer.

Specify #2838 for RSF/ROCF connection via CCITT V.23/V.24/V.28 interface. For use with ROCF the customer-supplied or PTT mandatory non-clocked external modem must include auto answer. For RSF an acoustic coupler can be used on this interface.

Specify #9517 for ROCF connection for 4800 bps attachment to external modem for switched networks with clocking and auto-answer via EIA RS-232-C interface. <)

(Hong Kong Only > Specify #2838 and #2839 for RSF/ROCF connection via CCITT V.23/V.24/V.28 interface. For use with ROCF the customer-supplied PTT mandatory non-clocked external modem must include auto answer. Specify #2839 with #9517. <)

(Japan only > Specify #2944 and #2943 for use with RSF only via 1200 bps Integrated Modem, nonswitched, together with the NTTCA-2 modem service cable connector. Note: Katakana is not supported for 3275-2 as a remote console. It is supported when the 3275 is emulated in the host system by the VM/Pass-Thru Facility program product. <)

## SPECIAL FEATURES

### NON-COMMUNICATIONS FEATURES

**Floating-Point Multiply Accelerator (#1100):** Optional on model group 3, standard on model groups 4 and 5. Executes frequently used floating-point multiply instructions in VLSI gate array hardware rather than in microcode, resulting in an improvement of execution speed for these instructions by a factor of 3 to 8. When this feature is installed in the model group 3 (factory installation only), mathematical functions supported in the Elementary Math Library (EML PRPQ P81005, 5799-BTB) are assisted by microcode to improve performance. The EML PRPQ provides subroutines that can be called from VS FORTRAN in the VM/SP environment. The following functions are microcode assisted: square root, logarithm (ln, log), exponentiation, sine, cosine, arctangent, power. Maximum: One. Field installation: No.

**Auto Start (#1200):** With this feature the processor can be powered-on by telephone call via the Remote Operator Control Facility (ROCF) (here an external modem with autoanswer is required), or automatically at a predetermined time and day of the week. A "Manual Operation" menu is provided at the operator console to preset the time and day of the week. Each day of the week may be associated with a different power-on time. The processor powers-on and proceeds with initial microprogram load, sets the TOD clock from a battery-operated clock, and then IPLs the system. This automated system bring-up is supported by VSE/SP 2.1, SSX/VSE 1.4.0, and VM/SP 1.4. The bring-up sequence is also followed after an AC power outage upon return of power with the option to suppress IPL to prevent uncontrolled restarts. IPL after an uncontrolled shut-down may need operator intervention. An additional clock is implemented in the processor to sustain time and date during power-off periods. During normal power-off this clock is powered by an additional stand-by power supply. In case of a power outage or if the processor is disconnected from the power net, a battery with a life time of approximately four years supplies the clock. The battery can be changed while the system has power-on or -off without losing the time and date or without interfering with the system. This feature will be available for 4361 shipments beginning in April 1985. Maximum: One. Prerequisite: An external modem with autoanswer is required for the function "Auto Start by telephone call via ROCF". Field Installation: Yes. For field installation an MES will be available by October 1985. Field installation on 4361s shipped prior to April 1985 or 4361s upgraded from 4331s, require RPQ 7B0987 as prerequisite.

**Block Multiplexer Channel (#1421):** Optional on model group 3, one standard on model group 4, two standard on model group 5. Provides attachment of high-speed I/O devices, except DASD. Data transfer rate is up to 1.25M bytes/second. Limitations: For data rate and attachment limitations for devices and communications lines refer to Maximum Configuration section above or to IBM 4361 Processor Channel Characteristics (GA33-1567), or use HONE aid ANCHLOAD. Maximum: One, optional for model group 3. Field Installation: Yes.

**High-Speed Block Multiplexer Channel 1, 2 and 3 (#1431, #1432, #1433):** (HS-BMPX 2 and 3 are not available on model group 3). Provides attachment of high-speed I/O devices including 3330/3333, 3340/3344, 3350, 3370, 3375, 3380 (3380 not on model group 3) via control units including 3830 model 2 and 3880. The ability to Block Multiplex and the facility for Multiple Requesting allow several I/O units to operate concurrently with greater channel efficiency. Can operate in Data Streaming Mode. Devices attached which cannot utilize block multiplexing will function as if attached to a selector channel. Up to eight control units may attach. Data transfer rate is up to 3M bytes per second on model groups 4 and 5 and up to 1.86M bytes per second on model group 3. Channel address and sub-channels: Same as on the block multiplexer channels. Limitations: (1) HS-BMPX 2 and 3 are not available on model group 3. (2) HS-BMPX is mutually exclusive with certain DASD/8809 Adapters: on model group 3, Adapter 2 (#3202) is mutually exclusive with HS-BMPX 1 (#1431); on model groups 4 and 5, Adapter 1 (#3201) is mutually exclusive with HS-BMPX 3 (#1433), Adapter 2 (#3202) is mutually exclusive with HS-BMPX 2 and 3 (#1432, #1433), Adapters 3 and 4 (#3203, #3204) are exclusive with any HS-BMPX (#1431, #1432, #1433). (3) For data rate and attachment limitations for other devices and communications lines refer to "Maximum Configuration" section above or to "IBM 4361 Processor Channel Characteristics" (GA33-1567), or use HONE aid ANCHLOAD. (4) 231X devices must be attached to a High-Speed Block Multiplexer Channel and cannot be used on a Block Multiplexer Channel. Maximum: One each. Field Installation: Yes. Prerequisites: #1431 for #1432; #1431 and #1432 for #1433.

**WSA Control Storage Expansion (#1801):** The control storage of the Workstation Adapter can be expanded by 64Kb to accommodate new functions. Limitations: None. Maximum: One. Field Installation: Yes. Prerequisite: Feature #2002.

**Workstation Adapter (#2002):** The Workstation Adapter (WSA) extends the total number of ports available on the DPA and the WSA to 40. The WSA supports the following features/functions beyond the Display/Printer Adapter capability: 3270 Extended Datastream for extended highlighting, seven colors, programmed symbols, screen sizes up to 3,564 characters, Distributed Function Terminal (DFT) mode and a 3278/3279 APL keyboard. Limitations: When the WSA is installed, the number of ports on the Display/Printer Adapter is reduced from 16 to 8. The functional level of the eight DPA ports remains unchanged. A maximum of three 4245-D12s or two 4245-D20s may be installed. The 3179 and 3180 Display Stations are supported in 3278/3279 Emulation mode. Maximum: One. Field Installation: Yes. Prerequisites: Each group of eight ports requires one 3299-1 Terminal Multiplexer. If a 4245 is used as system printer, then specify feature #9160 is required on the 4245-D12/D20, and specify feature #9261 is required on 4361 processors shipped until March 1986. Restrictions: Mutually exclusive with Loop Adapter RPQs 7B0795, 7B0796, 7B0797.

**DASD/8809 Adapter 1, 2, 3 and 4 (#3201, #3202, #3203, #3204):** (Adapters 3 and 4 are not available on model group 3). Allows attachment of the 3310, 3370 and 3340/3344 DASD or 8809 Magnetic Tape Units to the 4361 Processor. Limitations: On model group 3: 3340/3344 do not attach, 8809 attaches to Adapter 2 only.

**DASD Attachment:** Up to four strings of devices may be attached to each adapter. A string consists of one A-unit and up to three B-units. The attachable device types may be intermixed on each adapter but not within a string. Device strings may be configured on each adapter as follows:

- Up to four strings of 3310-A1s or A2s with 3310-B units attached, up to a maximum of four drives per string.

- Up to four strings of 3370-A1/A2s with 3370-B1/B2 units attached, up to a maximum of four drives (eight actuators/addresses) per string.
- Model groups 4 and 5 only: up to two strings of 3340-A2s with 3340/3344-B units attached, up to a maximum of eight drives per string can be attached to one or two DASD/8809 Adapters.

**8809 Magnetic Tape Unit Attachment:** Provides for attachment of the 8809 Magnetic Tape Unit. One 8809-1A may attach. Up to five 8809-2s and 3s may attach to the model 1A for a total of six 8809 Magnetic Tape Unit drives. The 8809 is not supported by VS1 and MVS.

**Limitations:** (1) Adapters 3 and 4 (#3203, #3204) are not available on model group 3 and 4. (2) DASD and 8809 are mutually exclusive on the same adapter. (3) DASD/8809 Adapters are mutually exclusive with certain High-Speed Block Multiplexer Channels. Model group 3: Adapter 2 (#3202) is mutually exclusive with HS-BMPX 1 (#1431). On model groups 4 and 5, Adapter 1 (#3201) is mutually exclusive with HS-BMPX 3 (#1433), Adapter 2 (#3202) is mutually exclusive with HS-BMPX 2 and 3 (#1432, #1433), Adapters 3 and 4 (#3203, #3204) are exclusive with any HS-BMPX (#1431, #1432, #1433). (4) On model group 3 only, Adapter 1 is limited to attachment of DASD only. (5) On model group 3 only, 3340/3344 attachment is not supported. (6) 3310 and 3370 are not supported by VS1 or by MVS in fixed block mode. MVS does not support directly attached 3340/3344. (7) For data rate and attachment limitations for other devices and communications lines refer to "Maximum Configuration" above or to IBM 4361 Processor Channel Characteristics (GA33-1567). (8) Use of direct-attached 3340/3344 introduces additional channel demands, and can have an effect on system performance, particularly in batch environment with heavy I/O load. Performance considerations should be carefully reviewed before proposing use of the 3340/3344. Maximum: One #3201, #3202, #3203 and #3204. Field Installation: Yes. Prerequisites: #3204 requires #3203, #3203 requires #3202, #3202 requires #3201.

**Byte Multiplexer Channel (#5248):** Optional on model groups 3 and 4 (standard on model group 5). Limitations: For data rate and attachment limitations for other devices and communications lines refer to "Maximum Configuration" section above or to IBM 4361 Processor Channel Characteristics (GA33-1567), or use HONE aid ANCHLOAD. Maximum: One, optional for model groups 3 and 4. Field Installation: Yes.

## COMMUNICATIONS FEATURES

**Note:** IBM Integrated Modems are not available on the 4361 Processor.

Communication Facilities, terminals, modems, other equipment supported: For supported terminals and communications facilities refer to the M2700 pages.

**Customer Responsibilities:** See M2700 pages for customer responsibilities regarding communication facilities and services.

**Communications Adapter:** Provides the basic control and common circuits for the direct attachment of up to eight communication lines in any combination, operating in the following transmission modes: synchronous (BSC), asynchronous (Start/Stop) Synchronous Data Link Control (SDLC), and HDLC (LAPB) for X.25 lines. Connection via 2-wire or 4-wire line is possible. Simultaneous bidirectional (full-duplex) data transmission over one line is not supported, except when operating in an X.25 network. Maximum aggregate data rate is 64,000 bps. The maximum speed of each of the eight lines is 19,200 bps except that line position one may be a synchronous high-speed line (BSC or SDLC) up to 64,000 bps. For number and speed of lines allowable refer to Table 4 above or see "IBM 4361 Channel Characteristics" (GA33-1567).

The Communications Adapter has the following structure: The Communications Adapter Base contains common circuits and control. Each of the telecommunication lines attachable requires one Line Attachment Base (two different types) and one line attachment

feature. Another feature serves for autocal unit interface. The following optional line interface features are available:

- Up to eight line features without internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) with clocking and EIA RS-232-C/CCITT V.24/V.28 or X.21bis interface.
- Up to eight line features with internal clock for attachment to external modems (Data Circuit-Terminating Equipment, DCE) without clock and EIA RS-232-C/CCITT V.24/V.28 or X.21bis interface (maximum of seven lines for X.25).
- Autocall Unit interfaces (EIA RS-366/CCITT V.25) for up to two of the installed lines with EIA RS-232-C/CCITT V.24/V.28 interface.
- One synchronous high-speed line feature (V.35 interface).
- Up to eight line features without business machine clock for attachment to X.21 Nonswitched Data Networks, or to X.25 Networks (maximum of seven lines).
- Up to eight line features without business machine clock for attachment to X.21 Switched Data Networks.
- Up to eight line features for synchronous transmission via local attachment without modems.

**Autocall Unit Interface (#1020):** Provides an interface to customer-supplied Automatic Calling Equipment allowing data links with remote stations to be automatically established on the switched telephone network. Automatic Calling Equipment complying with EIA RS-366 or CCITT V.25 interface may be attached. For the appropriate Automatic Calling Equipment, refer to M2700 pages. Maximum: Two. Cable Order: Required, for attachment to external equipment. Field Installation: Yes. Prerequisites: #1601 and #3701 (in switched operation) for each Autocall Unit Interface installed. #2835 is required in certain countries.

**Communications Adapter Base (#1601):** Allows attachment of up to eight lines plus Autocall Unit Interface (#1020) for up to two of the lines. Limitations: Each line attached reduces the number of available subchannels on the Byte Multiplexer Channel. See "Subchannels" above for details. Maximum: One. Field Installation: Yes. Specify: See Table 6 for required specify codes for each line feature attached.

**Communication Line Isolation (#2835):** Provides an isolation barrier between the modems or Automatic Calling Units and the Communications Adapter, as required by certain countries. Up to ten isolation barriers are available and may be used for one Remote Operator Console Facility, #2833, or #2838, #2839 (Hong Kong), for up to two Autocall Unit Interfaces (#1020), and for up to eight EIA/CCITT Interfaces (#3701). Maximum: One per line, ten on the system. Field Installation: Yes. Prerequisites: Each barrier must be associated with one #1020 or #3701 feature.

**EIA/CCITT Interface (#3701):** This feature may be intermixed with other line features. Each feature provides for the attachment of one external modem having EIA RS-232-C, CCITT V.24/V.28 or X.21bis interface for attachment to one switched or one nonswitched line. When this feature is installed in conjunction with Line Attachment Base for Clocked Modem (#4695), a BSC, a SDLC, or a X.25/HDLC line is supported with any line speed up to 19,200 bps. The maximum line speed on switched network backup or switched networks is dependent on country PTT services. When this feature is installed in conjunction with Line Attachment Base for Nonclocked Modems (#4696), then a BSC, a Start/Stop (including ASCII/TTC2 line protocol), or a SDLC line is supported. Transmission speeds supported are listed with feature #4696 below. Maximum: Eight. Cable Order: Required, for attachment to external equipment. Field Installation: Yes. Prerequisites: #1601. One #4695 or #4696 is required for each feature #3701 installed. #2835 is required to permit attachment to PTT communications facilities in certain countries. Specify: See Table 6 for line position codes. On machines shipped prior to February 1986, the speed of the EIA/CCITT interface is 9600 bps. If 19200 bps is required on those machines, then RPQ 7B1100 must be ordered (for Clocked Modems only).

**Line Attachment Base For Clocked Modems (#4695):** This feature is a prerequisite for all line adapters that attach to modems (Data Circuit-Terminating Equipment) and which provide clocking and comply with CCITT V.24/V.28 V.35, X.21, X.21bis interface recommendations. See the various line features below to determine when it is required. Maximum: A maximum of eight Line Attachment Bases #4695 and/or #4696 can be installed. Field Installation: Yes. Prerequisites: #1601.

**Line Attachment Base For Nonclocked Modems (#4696):** This feature is a prerequisite for all line adapters that attach to modems (Data Circuit-Terminating Equipment) and which do not provide clocking and comply with CCITT V.24/V.28 recommendation. See the various features below to determine when it is required. The clock speed can be wired at installation to one of the following:

- Start/Stop (IBM Type I): 75, 110, 134.5, 300, 600, 1200 and 2400 bps.
- Start/Stop (ASCII/TTT2): 75, 110, 134.5, 300, 600, 1200 and 2400 bps.
- BSC: 600 or 1200 bps.
- SDLC: 600 or 1200 bps.

Maximum: A maximum of eight Line Attachment Bases #4695 and/or #4696 may be installed. Field Installation: Yes. Prerequisites: #1601.

**High-Speed Modem Adapter (#4720):** Provides for the attachment of an external modem with clock having a CCITT V.35 or X.21bis interface. One nonswitched point-to-point BSC or SDLC line may be operated with speeds from 19,200 to 64,000 bps. Limitations: Is always installed in line position 1. No other line with speed higher than 19,200 bps can be installed. Maximum: One. Cable Order: Required for attachment to the external modem. Field Installation: Yes. Prerequisites: #1601 and #4695.

**Local Attachment Interface (#4801):** Provides circuits and controls for the local attachment of one BSC or SDLC remote station to the Communications Adapter without the use of modems at either device. Transmission speed can be strapped at installation time by the customer engineer at 1200, 2400, 4800 and 9600 bps. The feature provides clocking for both the Communications Adapter and the terminal. The attached terminal must be equipped with an EIA RS-232-C or CCITT V.24/V.28 interface, have no Business Machine Clocking and have an external modem cable. The distance to the terminal may be extended via a customer-provided cable to allow a

maximum distance between Communications Adapter and terminal of:

- 800m at 1200 bps
- 400m at 2400 bps
- 200m at 4800 bps
- 100m at 9600 bps

For distances beyond 120m, to protect against damage by lightning, shielded cables should be used. For installation details see "IBM 4300 Installation Manual/Physical Planning" (GA24-3667), Appendix D. The feature includes cables to attach the Communications Adapter to a customer-supplied terminal plate and from the terminal plate to the DTE external modem cable. Cable Order: Required for attachment of communications adapter and DTE to customer supplied terminal blocks. Maximum: Eight. Field Installation: Yes. Prerequisites: #1601 and 4695. Specify: See Table 6 for line position codes.

**X.21 Adapter for Nonswitched Networks (#5655):** Provides controls and circuits for attachment of one X.21 point-to-point or multipoint nonswitched communication line operating in SDLC transmission mode via a DCE complying with CCITT recommendation X.21 or X.25. In X.21 networks transmission may be at speeds of 2400, 4800, 9600 or 48,000 bps for point-to-point and 2400, 4800 and 9600 for multipoint operations. In X.25 networks transmission may be at speeds of 2400, 4800, or 9600 bps. Limitations: If feature #5655 operates with a speed of 48,000 bps it must be installed in line position 1 (specify #9711). No other line with speed higher than 9600 bps can then be installed. Maximum: Eight. Field installation: Yes. Prerequisites: #1601 and #4695. For operation of X.25 lines ACF/VTAM is required. Specify: See Table 6 for line position codes. #9711 is required for operation at 56,000 bps. Cable Order: Required for attachment to external equipment.

**X.21 Adapter for Switched Networks (#5656):** Provides controls and circuits for attachment of one X.21 switched communication line operating in SDLC transmission mode via a DCE complying with CCITT recommendation X.21. For details of support see the M2700 pages (Chart 3 and Chart L). Transmission may be at speeds of 2400, 4800 or 9600 bps. Maximum: Up to eight may be installed, subject to the overall data rate limitations of the Communications Adapter, refer to Table 4 above. Field Installation: Yes. Prerequisites: #1601, one #4695 is required for each #5656 installed. Specify: See Table 6 for line position code.

Table 6 - Communications Adapter Configuration Feature And Position Codes

## COMMUNICATIONS ADAPTER CONFIGURATION FEATURES AND POSITION CODES

Line Feature	Inter face	Att Base	1	2	3	Line Position 4	5	6	7	8
EIA/CCITT interface (for Clocked Modems)	#3701	#4695		#9532		#9534		#9536		#9538
			#9531		#9533		#9535		#9537	
EIA/CCITT interface (for Non-Clocked Modems)	#3701	#4696		#9522		#9524		#9526		#9528
			#9521		#9523		#9525		#9527	
Transmission Mode(1)										
Start/Stop(2) incl. ASCII/TTT2				#9682		#9684		#9686		#9688
			#9681		#9683		#9685		#9687	
High-Speed Modem Adapter	#4720	#4695		No position code required. Is always installed in line position one.						
X.21 Adapter for Nonswitched Networks	#5655	#4695		#9712		#9714		#9716		#9718
			#9711		#9713		#9715		#9717	

## MACHINES

X.21 Adapter for Switched Networks	#5656 #4695 #9721	#9722 #9723	#9724 #9725	#9726 #9727	#9728
Local Attachm. Interface	#4801 #4695 #9451	#9452 #9453	#9454 #9455	#9456 #9457	#9458
Autocall Unit Interface (3)	#1020	No position code required. Association with the desired line via manual operation in the field.			

**Note:** The aggregate data rate of the Communications Adapter is 64,000 bps. Line Features exceeding this aggregate may be installed, but not operated concurrently. To allow the aggregate of 64,000 bps to be achieved, the highest speed line must be installed in line position one, the next highest in line position two, etc. Each X.25 line, because of full-duplex operation, contributes twice the single line speed to the aggregated data rate.

1. BSC or SDLC transmission mode can be selected at installation time using the configuration tool.
  2. Start/Stop transmission mode requires EIA/CCITT Interface (for non-clocked modem, #3701 and prerequisite #4696). IBM Start/Stop Line Control Type 1 or TWX/TTC Type 2 is selected at installation time using the configuration tool.
  3. Is linked to the desired EIA/CCITT Interface (#3701) and prerequisite (#4695 or #4696) by the customer engineer. Maximum of two #1020s may be installed.
- X.25 transmission mode is not possible on line position 4. Maximum number of lines is seven.

## MODEL CONVERSIONS

Any downgrades of 4361 model groups are not available. Memory downgrades are not recommended for field installation. Customer price quotations and customer order acknowledgment letters for machine/model conversions must state: "Installation of this model upgrade involves the removal of parts which become the property of IBM." Depending on whether a feature on an installed 4331/4361 is standard, optional, or not available on the larger upgrade model of the 4361, different ordering actions will be required. Standard features of the 4361 model, which are optional but not installed on the machine to be upgraded, must be ordered via RPQ with the upgrade MES. The prices of these features are added to the model upgrade prices.

! \* UPGRADES FROM 4321/4331 TO 4361 PROCESSORS ARE NO LONGER AVAILABLE.

	Feature 4331	Number On 4361 MG3	RPQ for adding to 4361 MG 4 or 5
Adapter Power Prerequisite	#1001	--	7B0758
Control Storage Expansion	#1901	--	7B0697 4331-1 only
Display/Printer Apt. Expansion	#2001	--	7B0813
Block Multiplexer Channel, 1st	#1421	#1421	7B0811
Block Multiplexer Chan., Add'l	#1422	--	7B0759
Diskette Drive	#3401	--	7B0760
External Signals	#3898	--	7B0761
Byte Multiplexer Channel	#5248	#5248	7B0810
Power Interface	#5531	--	7B0812
Power Interface, Add'l	#5532	--	7B0762 to MG5 only
Floating-Point Multiply Accel.	--	#1100	7B0887

Optional features of the 4361 which are not currently installed on the upgrading machine may be ordered with the upgrade MES without restriction. However, conversion time may be extended. Those 4331 feature codes and specify codes which are not available on the 4361 must be deleted with the MES upgrade order. Features installed which are not available on the 4361 will be removed. The customer has two options: (1) If the parts to be removed are returned to IBM with the gate exchange, the removal is free of charge. (2) If the customer elects to keep removed parts, an RPQ must be submitted listing each feature to be removed from the 4331. There will be a charge for these RPQs. The removal of features must be scheduled prior to the machine conversion.

Upgrades from 4331 to 4361-N05 (16Mb): No direct upgrade is available. Must be performed in two steps via two MESs, that will be installed in sequence:

1. Upgrade the 4331 to the 4361 model group 5 with identical memory size. If identical memory size is not available, then upgrade to the next higher size, e.g. 4331-J02 (1Mb) to 4361-K05 (2Mb).
2. Upgrade the memory to the 16Mb (4361-N05).

**RPQs:** The following 4331 RPQs are included in the 4361 as standard or as optional features:

RPQ #	Description	Feature #
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ML4707 Hi-Speed Digital Interface #4717  
XD1603 STX Char in CRC of BSC lines Std  
MM5017 Additional Subchannels Std  
7S0276 Telegraph Term Ctrl 2 (TTY) Std  
SU0190 MVS Assist (for 4361-5 only) Std  
nnnnnn Various Special Language for DPA Std

**Note:** When a 4331 with RPQ 7S0276 installed is upgraded to a 4361, line position codes for the Start/Stop lines #968X must be included in the MES order (see Table 6).

1. The following RPQs for extended cable lengths are also available on the 4361: MM2195 (125 ft), XE0475 (50 ft), 7B0699 (75 ft), 7B0700 (100 ft).
2. The 4331 RPQs for connection of the Remote Support Facility (RSF) to the switched telephone network are also available on the 4361.
3. To install 4331 Loop Adapter features #4830, #4831, #4840 on a new 4361, prerequisite RPQs 7B0795, 7B0796, 7B0797 respectively, are required. To retain these features on a 4331 upgraded to a 4361, prerequisite RPQs XF3650, XF3963, XF3651 respectively, are required.
4. RPQ 7B1100 must be ordered if a higher speed EIA/CCITT interface feature is required for machines shipped prior to January 1986.

5. Loop Adapter RPQs 7B0795/6/7 are exclusive with 16 megabytes of main storage and with the workstation Adapter #2003.

**Administrative Note:** \* UPGRADES FROM 4321/4331 TO 4361 PROCESSORS ARE NO LONGER AVAILABLE.

**Model Upgrade Purchase Price:** Assumes standard features of the model group 4 or 5 that are optional on the model group 3 as being installed on the latter. For upgrades from 4331 assumes standard features of the 4361 model group 5 that are optional on the 4331-1, -2 or -11 as being installed on the latter. For country prices consult your local financial organization.

Depending on whether an optional feature of a 4331/4361 is standard, optional or not available on the 4361 model to be upgraded to, the following actions are required:

## 4331 UPGRADING TO 4361

Feature	Num- ber	Available On						Action if Feature	
		4331	4361	5	1	2	11	Is Installed	Is Not
Adapter Power Prerequisite	#1001	O	O	O	S	S	S	1	2 (7B0758)
Adapter Logic Prerequisite	#1002	O	O	O	N	N	N	4,5	None
Autocall Unit Interface	#1020	O	O	O	O	O	O	3	None
Flt-Pt Mply Accel	#1100	N	N	N	O	S	S	-	None
Auto Start	#1200	N	N	N	O	O	O	-	12
Block Mpx Channel	#1421	O	O	S	O	S	S	1	2 (7B0811)
Block Multiplexer Channel Add'l	#1422	N	O	N	N	O	S	1	2 (7B0759)
High-Speed Block Mpx Channel 1	#1431	N	O	N	O	O	O	3	None
2	#1432	N	N	N	N	O	O	-	None
3	#1433	N	N	N	N	O	O	-	None
Book Rack (acc'y)	#1480	O	O	O	O	O	O	-	None
Console Table (acc'y)	#1550	O	O	O	O	O	O	-	None
Communications Adapter Base	#1601	O	O	S	O	O	O	3,7	None
Control Storage Expansion (MG1)	#1901	O	S	S	S	S	S	1	2 (7B0697)
Display/Printer Adapter Expansion	#2001	O	O	S	S	S	S	1	2 (7B0813)
Workstation Adapter (Except Canada)	#2002	N	N	N	O	O	O	-	None
1200 bps Integrated Modem, Sw w Auto Answer	#2831	O	O	O	N	N	N	4,5	None
Nonswitched	#2832	O	O	O	N	N	N	4,5	None<)
DASD/8809 Adapter 1	#3201	O	O	S	O	O	O	3,7	None
2	#3202	N	O	N	O	O	O	3	None
3	#3203	N	N	N	N	O	O	-	None
4	#3204	N	N	N	N	O	O	-	None
Diskette Drive	#3401	O	O	O	S	S	S	1	2 (7B0760)
EIA/CCITT Int.	#3701	O	O	O	O	O	O	3	None
External Signals	#3898	O	O	O	S	S	S	1	2 (7B0761)
5424 Attachment	#3901	O	O	O	N	N	N	4,5	None
1401/1440/1460 Compatibility	#3950	O	O	O	N	N	N	4	None
Line Attach Base for Clocked Modems	#4695	O	O	O	O	O	O	3	None
Line Attach Base for Non-Clocked Modems	#4696	O	O	O	O	O	O	3	None
High-Speed Modem Adapter (Canada only)	#4720	O	O	O	O	O	O	3	None
1200 bps Integrated Modem Nonswitched	#4781	O	O	O	N	N	N	4,5	None
Switched with Auto Answer	#4782	O	O	O	N	N	N	4,5	None
Nonswitched with SNBU and Manual Answer	#4787	O	O	O	N	N	N	4,5	None
Nonswitched with SNBU and Auto Answer	#4788	O	O	O	N	N	N	4,5	None<)
Local Attachment Interface	#4801	O	O	O	O	O	O	3	None
For New Machines: Loop Adapter 1	#4830	O	O	O	N	7B0795	-	9	

## MACHINES

Loop Adapter 2	#4831	O O O	N	7B0796	-	9
Data Link Adapter	#4840	O O O	N	7B0797	-	9
For Upgrades from 4331:						
Loop Adapter 1	#4830	O O O	N	XF3650	9	None
Loop Adapter 2	#4831	O O O	N	XF3963	9	None
Data Link Adapter	#4840	O O O	N	7B0797	9	None
8809 Magnetic Tape Unit						
Unit Adapter	#4910	O O S	note 8	6		None
Byte Mpx Channel	#5248	O O S	O O S	1		2 (7B0810)
Power Interface	#5531	O O S	S S S	1		2 (7B0812)
Power Interface						
Add'l	#5532	O O O	N N S	1		2 (7B0762)
X.21 Adapter,						
Nonswitched	#5655	O O O	O O O	3		None
X.21 Adapter,						
Switched (9)	#5656	N N N	O O O	-		None
3340/3344 Direct						
Attachment	#7851	O O S	N S S	4		None
Direct Access Storage						
Compatibility	#7901	O O O	N S S	4		None
ECPS/VM/370	#8701	O O S	S S S	1		None
ECPS/MVS	-	N N N	N N S	-		None

### Legend:

- O Feature is optional
- N Feature is not available
- S Feature is standard
- R Feature available via RPQ
- No action

### Notes:

- 1) Delete feature on the MES order (chargeable to standard).
- 2) Feature must be ordered via RPQ with the upgrade MES.
- 3) No action, feature is carried to new 4361 model.
- 4) Feature must be cancelled/removed.
- 5) Feature can be returned to IBM without charge or feature can be removed from the 4331 via removal RPQ (charge). In latter case removed parts are the customer's property.
- 6) For attachment of the 8809 order DASD/8809 Adapter (#3201, #3202, #3203, or #3204), on model group 3 only via #3202. See DASD/8809 feature description for limitations and prerequisites. On a 4331-1 or 2 delete #4910. On the 4331-11 feature #4910 is standard and does not need to be deleted. When #320X is ordered, this involves swapping of the adapter hardware without charge.
- 7) On the 4331-11 this feature is standard. To retain it on the 4361, add the feature in the MES order for record purpose only. If not ordered, the feature will be removed.

8) 8809 attachment on 4361 model group 4 and 5 is via any DASD/8809 adapter(#3201, #3202, #3203, #3204), on model group 3 via #3202 only.

9) For installation of these features the specified RPQ is required.

10) Feature is equivalent to RPQ ML4707 for 4331 model groups 1, 2, 11.

11) Cancel the RPQ and order the feature for record purposes (without charge on a purchased machine).

12 For 4321/4331 to be upgraded to 4361 and for 4361s shipped prior to April 1985, RPQ 7B0987 is required as prerequisites for #1200.

## ACCESSORIES

The following items are available on a purchase-only basis. For shipment with the 4361, order the feature number indicated below:

**Book Rack and Cable Holder (#1480):** Provides a book rack and cable holder.

**Console Table (#1550):** Provides a convenient table for the operator console and one 3278/3279 Display Station. Color is the same as the machine.

## SUPPLIES (NONE)

## 4381 PROCESSOR

### PURPOSE

Provides power, arithmetic, control, logic, memory and channels through one or two integrated instruction processing units for a 4381 processor system.

### MODELS

The following models are removed from production:

Mdl Grp 1	Mdl Grp 2	Mdl Grp 3	Bytes of Processor Storage
L01	L02	---	4,194,304 Bytes
M01	M02	M03	8,388,608 Bytes
P01	P02	P03	16,777,216 Bytes
---	Q02	Q03	25,165,825 Bytes
---	R02	R03	33,554,432 Bytes

Memory model changes and feature additions will continue to be available for the Model Group 1, Model Group 2, and Model Group 3.

The following models are available:

Mdl Grp 11	Mdl Grp 12	Mdl Grp 13	Mdl Grp 14	Bytes of Processor Storage
L11	---	---	---	4,194,304 Bytes
M11	M12	M13	---	8,388,608 Bytes
P11	P12	P13	P14	16,777,216 Bytes
---	Q12	Q13	Q14	25,165,824 Bytes
---	R12	R13	R14	33,554,432 Bytes

Mdl Grp 21	Mdl Grp 22	Mdl Grp 23	Mdl Grp 24	Bytes of Processor Storage
M21	---	---	---	8,388,608
P21	P22	P23	P24	16,777,216
---	R22	R23	R24	33,554,432
---	---	S23	S24	50,331,648
---	---	T23	T24	67,108,864

**Prerequisites:** To provide the required system console, one of the following is required:

- One 3278-2A or 3279-2C console equipped with an operator console keyboard and an OCP.
- One 3205 console. An Operator Control Panel (OCP) on the 4381 is required for attachment of the 3205. This will be included on all 4381s.

A switch to enable/disable the optional channel-to-channel adapter is a part of OCP. It is active only if feature #1850, channel-to-channel adapter, is installed on the 4381.

A second console, although not required, will enhance systems operations for most customers and help increase system availability.

**Note:** The 3205 cannot be intermixed on the same processor with 3278-2A or 3279-2C consoles.

### HIGHLIGHTS

The following model groups are uniprocessors with one instruction processing unit:

MG1  
MG2  
MG11  
MG12  
MG13  
MG21  
MG22  
MG23

The following Model Groups are dual processors with two instruction processing units:

MG3  
MG14  
MG24

To improve the performance of the 4381 Processors running in S/370 Mode, the following assists and facilities are standard:

- Extended Control Program Support (ECPS) for MVS/SP Release 1.3 including cross memory services, the page fault assist function, and the ADDFRR instruction on all models.
- ECPS: VM for VM/SP with or without the VM/SP High Performance Option (HPO)
- Enhancements to ECPS: VM HPO on Mdl Grps 3, 12, 13, 14, 22, 23, and 24.
- Preferred Machine Assist to improve performance of MVS/SP Release 1.3 running under VM/SP with VM/SP HPO.

When the 4381 processor is operating in S/370 Extended Architecture (370-XA) mode, support is provided on all models by:

- MVS/XA
- VM/XA Systems Facility

There is support in both S/370 and S/370-XA mode for Engineering Scientific Processing as follows:

Engineering Scientific Assists:

- Multiply and Add Facility - all models
- Square Root Facility - all models
- Mathematical Function Facility - all models except Mdl Grp 1 and Mdl Grp 11.

**Channels:** There are six channels standard on the 4381 uniprocessor and six additional channels are available with the additions of feature #1870, Block Multiplexer Channels, Additional. For specific channel speeds by model, see the "IBM 4381 Uniprocessor Functional Characteristics Manual", GA24-3947.

There are twelve channels standard on the 4381 Dual Processors and six additional channels are available with the addition of feature #1871, Block Multiplexer Channels, Additional and a second six additional with feature Block Multiplexer Channels Second Additional (#1872) on the MG24 only. For specific channel speeds by model, see the "IBM 4381 Dual Processor Functional Characteristics Manual", GA24-4021.

**Problem Determination Procedures:** The Problem Analysis facility will be available on each 4381 Processor. Every user should be encouraged to take advantage of the benefits offered by Problem Analysis by invoking the procedure each time a machine failure occurs. Doing so will cause a set of routines to be executed by the system which will store failure data for later analysis and which will assist in isolating failing components. The benefit for the customer is that in many machine failure situations, it will not be necessary to await arrival of the CE to begin isolation of system problems, with the result of higher system availability for the customer. Use of Problem Analysis is a customer option. The capabilities of Problem Analysis are enhanced with the installation of one of the RSF features listed under "Specify", below.

## SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

### ● Power:

AC, 3-phase, 4-wire:	AC, 3-phase, 3-wire:
50 Hz	60 Hz
220V #2815	208V #9903
380V #2816	220V #2800*
400V #2825	240V #9915
415V #2826	

\* Colombia, Peru, Taiwan, and the Philippines

### ● (Japan only> Power (AC, 3-phase, 3-wire):

50 Hz	60 Hz
200V #2784	200V #2788
220V #2786	208V #2789
	240V #2793<)

### ● Machine Nomenclature:

Canadian (French) #2935  
English US #2924  
Japanese #2930  
Portuguese (Brazil) #2933  
Spanish #2931

### ● Cabling: See 3278 mdl 2A Display Console or 3279 Color Display Console mdl 2C for console cabling.

### ● Color: If no specify is selected, then the color of the 4381 Processor will be classic blue (#9063). If another color is required, specify: #9060 for willow green, #9061 for garnet rose, #9062 for sunrise yellow, #9064 for charcoal brown, #9065 for pebble gray.

### ● Remote Support Facility (RSF): The RSF utilization is a customer option. It is recommended to enhance the hardware availability of the 4381 Processor. It provides service personnel the capability of remotely controlling the 4381 from any RETAIN terminal and allows the CE to access the RETAIN data bank for the latest service aids and information from the customer site. When RSF is used, the customer must provide the telephone lines required for the RSF modem.

(Except Canada and Japan> When specified, each processor will be equipped with either a CCITT Interface or 1200 bps Integrated Modem (switched network, manual answer) for the RSF. Specify #2838 for CCITT Interface or #2836 for 1200 bps Integrated Modem, switched network, manual answer.<)

(Canada only> Specify #9510 for integrated modem, 1200 bps, switched network, manual answer. A telephone set with exclusion key and with Data Access Arrangement (DAA), compatible with CDT Type Coupler Series 1000A interface and operation, is required.<)

Specify #9511 for EIA/CCITT Interface, 1200 bps switched network. This feature is used by both the RSF and the ROCF functions. An external modem compatible with the WE 202S modem, interface and operation, or equivalent is required. The external modem must include auto answer.<

(Japan only> Each processor requesting RSF will be equipped with either a CCITT Interface or 1200 bps Integrated Modem. Specify #2838 for CCITT Interface for Acoustic Coupler. Specify #2944 for 1200 bps Integrated Modem. Also specify #2943 for the NTTCA-2 Modem service cable connector.<)

Specify #2950 if no RSF feature is desired on the machine. Note: Use of RSF is integral to the maintenance strategy of the 4381, and all customers should have one of the RSF features installed.

For details on ordering and customer responsibilities, see Systems and Procedures Manual.

### ● Remote Operator Console Facility (ROCF): The ROCF is an extension of RSF. It gives personnel at a host site the ability to dial-up and control a remote 4381 by means of host site programming support.

(Except Canada, Hong Kong, and Japan> Specify RSF feature #2836 for an integrated 1200 bps modem with auto answer capability or #2838 as CCITT Interface. CCITT Interface is for attaching customer-supplied or PTT-mandatory modems meeting CCITT recommendation V.23/V.24/V.28. The customer-supplied modem must include auto answer.<)

(Canada only> Specify #9511 for EIA-Interface, 1200 bps, switched network. This feature is used by both the RSF and the ROCF functions. An external modem compatible with the WE 202S modem, interface and operation, or equivalent is required. The external modem must include auto answer.<)

(Hong Kong only> Specify RSF feature #2838 as CCITT Interface and feature #2839. This interface is for attaching customer-supplied or PTT-mandatory modems meeting CCITT recommendation V.23, V.24, or V.28. The modem must include auto answer.<)

(Japan only> Specify RSF feature #2838 as CCITT Interface for Acoustic Coupler. The customer-supplied modem must include auto answer.<)

**Note:** Specify code #2836 operates in manual mode when used with RSF and auto answer mode when used with ROCF.

## SPECIAL FEATURES

**Channel-To-Channel Adapter (#1850):** One channel-to-channel feature is optionally available to interconnect a 4381 Channel to a Channel on another processor (4300, System/370, 30XX or 9370). Only one of the processors requires this feature. Requires three control unit positions on each of the connected channels. Maximum: One. Field Installation: Yes. Prerequisites: Keyboard #4631 must be specified on the primary 3278 Display Console mdl 2A or 3279 Color Display Console mdl 2C. Three control unit positions on a block multiplexer channel. Specify: #2727 on the 3278 mdl 2A or 3279 Color Display Console mdl 2C. 76-Key Japanese English Operator Console Keyboard Channel-to-Channel, may be specified in lieu of #4631.

**Block Multiplexer Channels, Add'l (#1870):** (Uniprocessor) An optional group of six Block Multiplexer Channels. Maximum: One. Limitation: Not available on 4381 Mdl Grps 3 and 14. If installed on a 4381 uniprocessor, this feature must be deleted with an MES order entry for field conversion to a 4381 dual processor. Deletion of this feature is for record keeping only. Prerequisite: A 4381 uniprocessor. Field Installation: Yes.

**Block Multiplexer Channels, Add'l (#1871):** (Dual processor) An optional group of six Block Multiplexer Channels, three attached to each processing unit. Maximum: One. Limitation: Not available on 4381 uniprocessors. Prerequisite: A 4381 dual processor. Field Installation: Yes.

**Block Multiplexer Channels Second Additional (#1872) (MG24 only):** A second optional group of six block multiplexer channels, three attached to each processing unit. Maximum: One. Limitation: Only available on MG 24 dual processor. Prerequisite: A MG24 dual processor with feature #1871. Field Installation: Yes.

## MODEL CONVERSIONS

The following 4381 Processor Field Upgrades are removed from production:

Model Group 1 to Model Group 2

## MACHINES

Model Group 2 to Model Group 3

The following 4381 Processor Field Upgrades are available:

Model Group 1 to Model Group 12  
Model Group 1 to Model Group 13  
Model Group 2 to Model Group 13  
Model Group 2 to Model Group 14  
Model Group 3 to Model Group 14  
Model Group 11 to Model Group 12  
Model Group 12 to Model Group 13  
Model Group 13 to Model Group 14  
Model Group 1 to Model Group 22  
Model Group 2 to Model Group 23  
Model Group 3 to Model Group 24  
Model Group 11 to Model Group 21  
Model Group 11 to Model Group 22  
Model Group 12 to Model Group 23  
Model Group 13 to Model Group 23  
Model Group 13 to Model Group 24  
Model Group 14 to Model Group 24  
Model Group 21 to Model Group 22  
Model Group 22 to Model Group 23  
Model Group 23 to Model Group 24

These upgrades require that the same or larger processor storage is selected. Memory model changes from a smaller to a larger size may be made in the field. Memory model changes from a larger to a smaller size and processor model downgrades are not recommended.

Note: RPQ S00602 is required for upgrade of a purchased 4381 uniprocessor to a 4381 dual processor when Block Multiplexer

Channels Additional (#1870) is not installed on the machine to be upgraded. The following upgrades are affected:

Model Group 2 to Model Group 14  
Model Group 13 to Model Group 14  
Model Group 13 to Model Group 24  
Model Group 23 to Model Group 24

Installation of a change from one model to another may involve the removal of parts which become the property of IBM.

## ACCESSORIES

An operator work station with modesty skirt has capabilities for two operators with two 3278 mdl 2A/3279 mdl 2C and room for reference material. Attachable book racks may be ordered for manual storage and also serve as a cable control device for the 3278 mdl 2A/3279 mdl 2C, telephones, etc. Table dimensions are 1590mm x 815mm and is equipped with gliders. The following items are available on a purchase-only basis. For field installation, order feature via MES. For shipment with machine, order the feature number indicated below.

**Bookrack and Cable Holder (#1480):** Up to four racks can be mounted on one table.

**Console Table (#1550).**

## SUPPLIES (NONE)

## 4575 PROCESSOR

### PURPOSE

The 4575 Processor is a System/88 High Availability/Horizontal Growth processor. Each 4575 Processor has twenty (20) attachment slots for memory, processor and controller boards. The processor also provides rack space for two 4580 Model 001 Disk Drives, one 4968 Autoload Streaming Magnetic Tape Unit, plus rack space in the rear of the cabinet for Communication Adapter Chassis, and Link Connectors.

The 4575 comes standard with duplicate power supplies and a battery backup for memory retention during short duration power failures. Major design points for the 4575 Processor are:

Fault Tolerance  
Transaction Processing  
Horizontal Growth

Duplexed components (including processors, memory, direct access devices, and controllers) and hot plugability provide a fault tolerant environment completely transparent to programmers and end-users.

System operations are performed through the attachment of an IBM Personal Computer.

Multiple S/88 processor modules (4575 Processor and 4576 Processors) can be interconnected to form a S/88 system via the S/88 Link facilities. Multiple S/88 systems can be interconnected to form a Network using the S/88 Network facilities. This ability to interconnect multiple S/88 processors and S/88 systems while maintaining a single system image provides a system with powerful horizontal growth capabilities. Depending on the mix of features installed, the 4575 has the capability to support the attachment of up to 128 communications ports, up to 6.7GB of duplexed direct access storage and up to 12MB of duplexed memory.

### MODELS

**Model 20B:** The 4575 Processor Model 20B is offered in one standard configuration. The standard configuration includes a group of standard features. Special features may be added to the standard configuration to provide additional system capacity and function.

The 4575 contains an enclosure rack with duplexed power supplies, battery backup and 20 Central Electronic Complex (CEC) slots for memory, processors and controllers. It also contains rear rack space for Communications Adapter Chassis and Link Connectors. It is a multiprocessor capable of executing two instruction streams simultaneously. A model 20B processor board contains sets of paired microprocessors that are capable of executing two instruction streams simultaneously. In each pair, one microprocessor executes application instructions and the other executes operating system instructions.

All components on the 4575 Processor board, including the microprocessors, are also duplicated. As the two microprocessors are executing system and application instructions, another set of two microprocessors are executing exactly the same instructions. (Since the processor board is duplexed, there are two more pairs of micro-processors also executing the same instructions). The results produced by the two sets of micro-processors are continuously compared. If a discrepancy in the results is detected, the entire board is taken out of service. If one board is taken out of service, the partner board continues to process in a simplex fashion until the defective board is replaced. Integrated checking and comparator logic on each processor board provide high levels of integrity.

**Configuration:** The 4575 is only offered in one predetermined configuration. The standard configuration includes a group of standard features:

- 1 Streaming Tape Controller (1600/3200 BPI)
- Four Megabyte Memory w/controller (duplexed pair)

- Communications Controller (duplexed pair)
- 1 Communications Adapter Chassis
- 1 Remote Support Line/Clock Adapter
- 4580 DASD Controller (duplexed pair)

Additional components such as DASD devices, a tape unit, and an IBM PC must be ordered separately to complete the system. In addition, special features may be added to the system to expand the Model 20B growth capability.

### HIGHLIGHTS

- **Hardware Implementation of Fault Tolerance:** The S/88 provides Fault Tolerant Processing by combining hardware components with logic circuitry that continually checks for errors and by providing duplexed components that operate in parallel. Duplexed components that fail are automatically taken out of service without affecting system performance or operations.
- **Duplexed Configurations:** Every major component (except tape) is duplexed in a S/88 processor configuration. Duplexed processor boards, memory boards, and communications controller boards execute in synchronization, continually comparing results with their partner to maintain data integrity and to provide a backup in cases of component failure. Duplexed disk drives and controllers operate in synchronization under control of the operating system providing backup to each other in case of failure. Duplicate Link Controllers and cabling components provide double the capacity of one link during normal operation and a backup link in the event of failure.
- **Hot Plugability:** This feature permits S/88 components to be removed or replaced during full system operation without affecting system operations or requiring power shut down. This feature allows most failing components to be repaired or replaced while complete system operation remains intact.
- **Data Integrity:** The duplexed S/88 components and the S/88 software help to maintain data integrity. Data integrity is a standard feature integrated into the S/88 hardware and software.
- **Distributed Processing:** Multiple S/88 processor modules can be interconnected via the S/88 Link. This ability to interconnect multiple S/88 modules while constantly maintaining a single system image of the available resources, provides a distributed processing environment transparent to the end user.
- **Horizontal Growth:** Additional processors and their attached resources (i.e., memory, DASD and peripherals) can be added to existing S/88 systems via the S/88 Link facility without interrupting system operations. Once the new processor is attached to the S/88 Link, all of its resources become available to the other processors within the System.
- **Continuous Hardware Component Checking:** Hardware operations are continuously checked on all S/88 processor, memory and controller boards. This continuous checking is generally implemented by duplexed circuitry contained on the board itself. This approach of continuous checking for operational and data errors provides for instantaneous detection of malfunctions, maintaining both operational and data integrity.
- **Remote/Automatic Service:** The error detection functions described above automatically remove failing components from service. At removal time, diagnostics are automatically run on the failing component and the component is placed back into service if diagnostics show no failure. If the diagnostics determine that a CEC component has a hard failure, the S/88 will automatically call the S/88 Support Center and report the problem. The S/88 Support Center will then diagnose the problem and, if required, will express ship a replacement component to the customer site. Automatic calls are also

placed to the S/88 Support Center whenever limits are exceeded on soft CEC component failures.

**Customer Responsibilities:** The customer is responsible for:

1. Understanding the management of the design, installation and control of System/88 as described in the System/88 publications.
2. Designing and implementing user application as necessary.
3. Carrying out approved problem determination and resolution in conjunction with the IBM System/88 Support Center.
4. Providing a data link to the IBM System/88 Support Center.
5. Installing service level updates and fixing as appropriate.
6. Operating the System/88 in a duplexed configuration.
7. Ensuring that the Personal Computer to be used as the system console has been set up prior to System/88 installation.

**Problem Determination:** Initial problem determination actions will be automatically performed by the System/88. If the System/88 is under a service contract or under warranty, failing CEC components will cause the System/88 to automatically notify the System/88 Support Center. When, as a result of a Customer Problem Analysis and Resolution procedure performed either automatically by the System/88 Support Center and/or on-site by the customer, the identified failing unit is one of the Customer Replaceable Units, the customer will be informed that IBM will arrange pickup of the failing unit and delivery of a unit in good working order. The customer is responsible for removal of the failing unit, for the installation and verification of the delivered unit.

In all other cases, the customer may call an IBM Customer Engineering service number to request on-site assistance which will be provided at the applicable hourly rates and terms and conditions.

**Security, Auditability and Control:** User Management is responsible for evaluation, selection, and implementation of security features, for administrative procedures, and for appropriate controls in application system. If sensitive data is sent over external communication facilities, user management may wish to consider the application of cryptography.

**Configuration:** The System/88 and its associated I/O devices provide considerable flexibility and expandability. Contact your IBM Marketing Representative for assistance in developing a configuration that meets your application and performance needs.

**System Console Function:** An IBM Personal Computer or IBM Personal Computer XT, or their equivalent, must be used as the system console (monitor terminal) for each processor module in a System/88. Refer to the System/88 IBM Personal Computer Terminal Program Product (5732-019) for additional information and prerequisites.

Exchange, rather than repairing in place, is the recommended service philosophy for the Personal Computer to be used as the System Console.

The Personal Computer must be set up by the customer prior to System/88 installation.

**Publications::** System and Operating System:

- SC34-0664 "Introduction to the Operating System"
- SA34-0302 "Site Planning Guide"
- SC34-0666 "OS Commands"
- SC34-0667 "System Administrator's Guide"
- SY34-0356 "User's Maintenance Guide"
- SC34-0694 "The Analyze System Facility Guide"

**Data Communications:**

- SC34-0667 "Introduction to Communications"
- SC34-0678 "Communications Software: 3270 Support and 3270 Emulation Guide"
- SC34-0679 "Binary Synchronous Communication Guide"
- SC34-0680 "Using the Remote Job Entry Facility Guide"
- SC34-0792 "X.24/X.29 Networking Facility Guide"
- SC34-0775 "Synchronous Data Link Control Guide"
- SC34-0757 "Primary and Secondary SNA Planning and Operations Guide"

- SC34-0758 "Primary and Secondary SNA Programming Guide and Reference"
- SC34-0759 "APPC Planning and Operations Guide"
- SC34-0759 "APPC Programming Guide and Reference"
- SL23-0156 "System/88 Communications and System Management User's Guide"

**COBOL:**

- SC34-0672 "COBOL Language Reference"
- SC34-0673 "COBOL Subroutines Reference"
- SC34-0674 "Transaction Processing Services COBOL Supplement"
- SC34-0675 "Forms Management System COBOL Reference"

**C:**

- SC34-0746 "C Language Reference"
- SC34-0819 "C Subroutines Reference"
- SC34-0747 "Transaction Processing Services C Supplement"
- SC34-0748 "Forms Management System C Reference"

**PL/I:**

- SC34-0669 "PL/I Subroutines Reference"
- SC34-0668 "PL/I Language Reference"
- SC34-0670 "Transaction Processing Services PL/I Supplement"
- SC34-0671 "Forms Management System PL/I Reference"

**BASIC:**

- SC34-0681 "BASIC Language Reference"
- SC34-0682 "BASIC Subroutines Reference"
- SC34-0683 "Transaction Processing Services BASIC Supplement"
- SC34-0684 "Forms Management System BASIC Reference"

**FORTRAN:**

- SC34-0685 "FORTRAN Language Reference"
- SC34-0686 "FORTRAN Subroutines Reference"
- SC34-0687 "Transaction Processing Services FORTRAN Supplement"
- SC34-0688 "Forms Management System FORTRAN Reference"

**PASCAL:**

- SC34-0689 "Pascal Language Reference"
- SC34-0690 "Pascal Subroutines Reference"
- SC34-0691 "Transaction Processing Services Pascal Supplement"
- SC34-0692 "Forms Management System Pascal Reference"

**ORACLE:**

- GC34-0752 "IBM System/88 ORACLE Licensed Program Specification"
- SC34-0733 "ORACLE User-Friendly Interface User's Guide"
- SC34-0734 "ORACLE Data Base Administrator's Guide"
- SC34-0735 "ORACLE COBOL Call Interface Reference"
- SC34-0736 "Introduction to ORACLE"
- SC34-0737 "ORACLE User-Friendly Interface Reference"
- SC34-0738 "ORACLE Interactive Application Facility Application Designer's Guide"
- SC34-0739 "ORACLE Interactive Application Facility Application Designer's Reference"
- SC34-0740 "ORACLE Interactive Application Facility Terminal Operator's Guide"
- SC34-0741 "ORACLE Interactive Application Facility Terminal Operator's Reference"
- SC34-0742 "ORACLE Report Generator"
- SC34-0743 "ORACLE Report Text Formatter"
- SC34-0744 "ORACLE Error Messages and Codes"
- SC34-0745 "ORACLE PL/1 Call Interface Reference"
- SC34-0862 "ORACLE Precompiler Interface Reference"
- SX34-0175 "ORACLE Keyboard Aid"

**Miscellaneous:**

- SC34-0693 "Text Editor User's Guide"
- SC34-0694 "The Analyze System Facility Guide"

- SX34-0169 "Keyboard Aid/Template"

#### SPECIFY

- Power Cord: Standard 4.3m (14 ft.). All devices mounted within the processor cabinet receive power from the processor cabinet.
- Power (AC, 1-phase): Specify the following:  
 60 Hz  
 120V #9911

#### SPECIAL FEATURES

**4580 DASD Controller (#1000):** (NO LONGER AVAILABLE) This Direct Access Storage Device (DASD) Controller provides system control and management for the 142MB 4580 Disk Drives. The controller interfaces directly to the 4580 Disk Drives. Each controller supports up to four 4580 Disk Drives. Each controller requires one CEC slot. The 4580 DASD Controllers must be ordered in duplexed pairs. Corequisite: A 4580 Model 001 Disk Drive. Field Installation: Yes. Maximum: Four (4) duplexed pairs of 4580 DASD Controllers (eight #1000) can be attached to the 4575 and a maximum of 32 physical 4580 Model 001 Disk Drives can be spread across the controllers. One duplexed pair of DASD controllers is included as a standard feature on the 4575. Minimum: A S/88 processor module must be configured with a minimum of one duplex pair of Disk Drives.

**4581 DASD Controller (#1010):** (NO LONGER AVAILABLE) This Direct Access Storage Device (DASD) Controller provides system control and management for the 448MB 4581 Disk Drives. The controller interfaces to the 4581 DASD Director (#1011) which then interfaces to the 4581 Disk Drive. Each 4581 DASD Controller (#1010) supports a maximum of eight 4581 DASD Directors (#1011) and receives its power from the S/88 processor. Each 4581 DASD Controller (#1010) requires one CEC slot. The 4581 DASD Controller (#1010) must be ordered in duplexed pairs. Co-requisite: A 4581 DASD Director (#1011). Field Installation: Yes. Maximum: Three (3) duplexed 4581 DASD Controller pairs (six # 1010) can be attached to a 4575, and a maximum of 32 physical 4581 Disk Drives can be spread across the controllers. Minimum: A S/88 Processor Module must be configured with a minimum of one duplex pair of Disk Drives.

#### 4580 DASD Controller (#1020): (NO LONGER AVAILABLE)

This direct access storage device (DASD) controller provides system control and management for the 142MB 4580 Disk Drives. The controller interfaces directly to the 4580 Disk Drives. Each controller supports up to four 4580 Disk Drives. Each controller requires one Central Electronic Complex (CEC) slot. The 4580 DASD Controllers must be ordered in duplexed pairs. The co-requisite for a controller is a 4580 Disk Drive. Limitations: Four duplexed pairs of #1020s can be installed on a 4575 Processor. Each 4575 must be configured with a minimum of one duplexed pair of 4580 Disk Drives. Field Installation: Yes.

A maximum of four duplexed 4580 DASD Controllers can be attached to a 4575 mdl 20B and a maximum of 16 duplexed 4580 Disk Drives can be spread across the controllers. One pair of 4580 DASD Controllers is standard on the 4575 mdl 20B.

**4581 DASD Controller (#1030):** This direct access storage device (DASD) controller provides system control and management for the 448MB 4581 Disk Drives. The controller interfaces to the 4581 DASD Director Feature (#1011), which then interfaces to the 4581 Disk Drive. Each 4581 DASD Controller supports a maximum of eight 4581 DASD Directors. Each 4581 DASD Controller requires one CEC slot. The 4581 DASD Controllers must be ordered in duplexed pairs. The co-requisite for a 4581 DASD Controller is a 4581 Disk Drive equipped with a DASD Director (#1011). Installed #1011s will operate with the new #1030 Controller without modification. Limitations:

Three duplexed pairs of #1030s and 16 duplexed pairs of 4581 Disk Drives can be installed on a 4575 Processor. Field Installation: Yes.

**4968 Streaming Tape Controller (#1100):** The Streaming Tape Controller provides system management and control for one 4968 Autoload Streaming Magnetic Tape Unit. The controller cables directly to the 4968 tape drive. This controller is available as a simplex controller only. Each controller requires one CEC slot. Corequisite: A 4968 Autoload Streaming Magnetic Tape Unit Field Installation: Yes. Maximum: The S/88 supports a maximum of four (4) tape controllers. One Streaming Tape Controller for the 4968 tape unit is included as a standard feature on the 4575 Model 20B.

**4585 Streaming Tape Controller (#1110):** The Streaming Tape Controller provides system management and control for one IBM 4585 Autoload Magnetic Tape Unit, Model 001. The controller cables directly to the 4585 tape drive. The controller is available as a simplex controller only. Each controller requires one CEC slot. Co-requisite: a 4585 Autoload Magnetic Tape Unit, Model 001. Field Installation: Yes. Maximum: The S/88 supports a maximum of four (4) tape controllers.

**Communications Controller (#1200):** A duplexed pair of Communication Controllers supports a maximum of one Communication Adapter Chassis (#1220) and one Communications Adapter Expansion Chassis (#1230). With these two adapter chassis the duplexed communications controller pair can support up to sixteen line adapters. These adapters can support combinations of asynchronous, binary synchronous, X.25, and SDLC lines. Each controller receives power from the S/88 processor and requires one CEC slot. Communications Controllers (#1200) must be ordered in duplexed pairs. Corequisites: Communications Adapter Chassis (#1220) and at least one line adapter (Feature #1201, #1202, #1203, #1204, #1205, #1206, or #1207). Field Installation: Yes. Maximum: Four (4) duplex communications controller pairs (eight #1200) can be installed in a 4575. A duplexed pair of Communications Controllers is included as a standard feature of the 4575 Model 20B.

**Full Modem Asynchronous Line Adapter (#1201):** The Full Modem Asynchronous Line Adapter provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 9.6K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communication Controller (#1200). Each port on the card provides the signals required for remote communications via a modem (using cable #1801). The adapter uses cable #1801 for attachment to external modem devices. The adapter can also be used in conjunction with a crossover cable (#1816) to provide direct connection of peripheral devices such as terminals and printers. The direct connect capability can be achieved using either cable #1816 and #1806 for attaching to an IBM PC or a terminal with a male connector or #1816 plus #1802, #1803, or #1804 for attaching to a terminal with a female connector. Field Installation: Yes.

**Direct Connect Asynchronous Line Adapter (#1202):** The Direct Connect Asynchronous Line Adapter provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 9.6K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communication Controller (#1200). The adapter can be used with direct connect communication cables (#1802, #1803, #1804) providing for local attachment to terminals and printers with a female connector, or it can be used with the direct connect cable (#1806) for providing local attachment of the IBM PCs. Field Installation: Yes.

**Direct Connect Printer Adapter (#1203):** The Direct Connect Printer Adapter provides one port for connection of a line printer. The adapter requires one slot in the Communications Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communications Controller (#1200). The adapter is used with direct connect twinaxial cable (#1819, #1820) for providing local attachment of the printer. For distances 15m (50 ft.) or less, the Printer Connect Cable #1819 is required. Distances greater than 15m (50 ft.) but less than 930m (3000 ft.) require the Printer Connect Cable #1820, 0.3m (1 ft.), and a customer supplied twinaxial extension cable. Field Installation: Yes. Twinaxial Cable Specifications: Refer to GA24-4028 for the 5262 or GA21-9337 for the 4245.

The System/88 Operating System (Release 2) supports the IBM 5262 Line Printer (Model 1) and the IBM 4245 Line Printer (Model T20) with the following print bands:

## 5262 Line Printer

Character Set	Specify
	A B
48 International	#2767 #2950
63 International	#9523 #2950
64 International	#2768 #2950
96 International	#2770 #2950

## 4245 Line Printer

Character Set	Specify
48 International	#9520 #2950
63 International	#9524 Not req.

**Remote Support Line/Clock Adapter (#1204):** One Support Line/Clock Adapter is included as a standard feature of the 4575 Model 20B. Since it is included as a standard feature, it is not necessary to order the #1204 separately unless needed as a spare in the event of failure. One adapter (#1204) is required per S/88 system. If multiple processor modules are interconnected via the Link Controller (#1400), only one adapter (#1204) is required. If more than one adapter (#1204) exists only one can be active in each S/88 system. The Remote Support Line/Clock Adapter provides one line port for the Support Modem (#1300) used for remote system support. This adapter also provides a battery powered system clock that is accessed only during a module power up. This adapter requires one slot and must be located in the last slot (slot #7) of the first Communication Adapter Chassis (#1220). Connection to the support modem is via a modem cable (cable #1801). Power is supplied to the adapter from the Communication Controller (#1200). Field Installation: Yes.

**High Performance Full Modem Synchronous Line Adapter (#1205):** Provides one RS-232-C or RS-422 line port. The maximum bit rate is 19.2K bps. The adapter supports bisync, SDLC, and X.25 protocols and requires one slot in a Communication Adapter Chassis (#1220) or Expansion Chassis (#1230). Power for the adapter is supplied via the cables from the Communication Controller (#1200). Modem Cable #1801 is required for modem support. The adapter can also be used in conjunction with the Crossover Cable (#1815) or a customer supplied RS-422 cable to provide direct connection of synchronous terminal devices. Field Installation: Yes.

**High Performance Direct Connect Asynchronous Line Adapter (#1206):** The High Performance Direct Connect Asynchronous Line Adapter (#1206) provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 19.2K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communication Controller (#1200). The adapter can be used with direct connect communication cables (cables #1802, 1803, 1804) providing for local attachment to terminals and printers with a female connector or with the direct connect cable (#1806) for local attachment of the IBM PCs. Field Installation: Yes.

**High Performance Full Modem Asynchronous Line Adapter (#1207):** The High Performance Full Modem Asynchronous Line Adapter (#1207) provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 19.2K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communications Controller (#1200). Each port on the card provides the signals required for remote communications via a modem (using cable #1801). The adapter can also be used in conjunction with the crossover cable (#1816) to provide direct connection of peripheral devices such as terminals and printers. The direct connect capability can be achieved using either cable #1816 and #1806 for attaching to an IBM PC or a terminal with a male connector, or #1816 plus #1802, #1803, or #1804 for attaching to a terminal with a female connector. Field Installation: Yes.

**Communications Adapter Chassis (#1220):** The Communications Adapter Chassis provides slots for attaching the communication

line adapter cards. One chassis connects to a duplexed pair of Communications Controllers (two #1200). Each chassis supports the attachment of up to eight (8) line adapter cards, (#1201, #1202, #1203, #1204, #1205, #1206 or #1207). A maximum of seven of the cards can be high performance adapter cards (#1203, #1205, #1206, or #1207). Power for Line Adapter Cards is provided by the Communications Controller (#1200) through the chassis. Connectors and fault indicators are provided for each slot in the Communication Adapter Chassis (#1220). The chassis can be physically mounted in the rear rack of a 4575, or in the front or rear rack of a 4577 Expansion Cabinet. Prerequisites: A duplexed pair of Communications Controllers (two #1200). Field Installation: Yes. Maximum: A total of six (6) Communications Adapter Chassis (#1220) and Communications Adapter Expansion Chassis (#1230) can be mounted in the rear rack of a 4575. A 4577 Expansion Cabinet may be required to attach additional Communication Adapter Chassis (#1220) or Communications Adapter Expansion Chassis (#1230). One Communications Adapter Chassis (#1220) is included as a standard feature of the 4575 Model 20B.

**Communication Line Adapter to Communication Adapter Chassis Assignment (#1220):** Specify Line Adapter feature type and quantity and Communication Adapter Chassis (#1220) sequence as #8XYZ where:

'X' = the sequence number of the Communication Adapter Chassis (#1220) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet,

'Y' = the last digit (1 - 7) of the Communication Line Adapter feature number (#1201 - #1207)

'Z' = the quantity of that particular Communication Line Adapter Feature to be installed in this Communication Adapter Chassis (#1220)

A separate specify code is required for each feature type (#1201 - 1207) ordered for installation in this Communication Adapter Chassis (#1220). For example, an order that included 2 each - #1201, 1 each - #1202, 1 each - #1203, 2 each - #1205, for installation in the 2nd Communications Adapter Chassis (#1220) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet, would require the following Specify Codes:

#8212 (2 each - #1201)  
#8221 (1 each - #1202)  
#8231 (1 each - #1203)  
#8252 (2 each - #1205)

**Communications Adapter Expansion Chassis (#1230):** The Communication Adapter Expansion Chassis provides slots for an additional eight communication Line Adapters, only seven of which can be high performance adapters. Power for line adapter cards located in the Communications Expansion Chassis (#1230) is provided by the Communication Controller (#1200) via the Communications Adapter Chassis (#1220). Connectors and fault indicators are provided for each slot in the chassis. Prerequisites: A duplexed pair of Communications Controllers (two #1200) and a Communications Adapter Chassis (#1220). Field Installation: Yes. Limitations: Only one Communications Adapter Expansion Chassis can be connected to a Communications Adapter Chassis (#1220).

**Communication Line Adapter to Communication Adapter Expansion Chassis (#1230):** Specify Line Adapter feature type and quantity and Communication Adapter Expansion Chassis Assignment (#1230) sequence as #9XYZ where:

'X' = the sequence number of the Communication Adapter Expansion Chassis (#1230) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet

'Y' = the last digit (1 - 7) of the Communications Line Adapter feature number (#1201 - #1207)

'Z' = the quantity of that particular Communication Line Adapter Feature to be installed in this Communication Adapter Expansion Chassis (#1230)

A separate specify code is required for each feature type (#1201 - 1207) ordered for installation in this Communication Adapter Expansion Chassis (#1230). For example, an order that included 2

each - #1201, 1 each - #1202, 1 each - #1203, 2 each - #1205, for installation in the 2nd Communications Adapter Expansion Chassis (#1230) on a 4575 or 4577 Processor or a 4577 Expansion Cabinet, would require the following Specify Codes:

#9212 (2 each - #1201)  
#9221 (1 each - #1202)  
#9231 (1 each - #1203)  
#9252 (2 each - #1205)

**Link Controller (#1400):** The Link Controller provides control and management for the local inter-system communication. The controller interfaces directly to the Link Connector (#1410) via the Link Cables #1808, 1809, 1810, or 1811, or customer supplied cables. The controller provides transmit and receive protocol management for the 1.4MB serial interface. The controller requires one CEC slot. Link controllers must be ordered as duplex pairs so that a single failure will not prevent inter-processor communication. The continuous aggregate bandwidth of an operational pair of controllers approaches 2.8MB per second for the duplexed pair. Only one (1) Link Controller pair (two #1400) is required to attach a processor module to the S/88 Link, hence one (1) Link Controller pair (two #1400) is the maximum that can be configured on a S/88 processor. Field Installation: Yes.

**Link Connector (#1410):** The Link Connector is a passive device that provides cable connection points for the interconnection of up to six Link Controllers (#1400) on a S/88 Link. Attachment of more than six Link Controllers (#1400) to a S/88 Link requires the interconnection of two or more Link Connectors (#1410) in series. Each additional Link Connector (#1410) attached to the S/88 Link requires a cable connection point on the Link Connector (#1410) it is being attached to, a 4591 Link Extender and one of its own cable connection points. All Link hardware components (Controllers, Connectors, Extenders, and Cables) must be ordered in pairs to achieve fault tolerant operation. A fully configured S/88 system, consisting of 32 Link connected Processor Modules, requires 32 Link Controller pairs (64 #1400s), eight (8) Link Connector pairs (16 #1410s), seven (7) 4591 Link Extender pairs (14 - 4591 Link Extenders) and associated cable pairs. The Link Connector can be mounted in the rear rack of a S/88 Processor Cabinet or the front or rear rack of a 4577 Expansion Cabinet. Duplex Link Connectors (#1410) should be installed in adjacent Cabinet positions. The maximum distance between a Link Controller (#1400) and Link Connector (#1410), without the use of the 4591 Link Extender is 750 ft. Link Connectors (#1410) should be installed in the Processor Module closest to the physical center of the S/88 Link structure to minimize cabling requirements. Additional processors can be added dynamically to the Link, providing on-line growth to the link structure without impacting function. The two foot Link Cable (#1808) is used within the S/88 Processor Cabinet that houses the Link Connector (#1410) for connection between that processor's Controllers (#1400) and Connectors (#1410). The ten foot Link Cable (#1809) is used if the Link Connector (#1410) is located in a 4577 Expansion Cabinet adjacent to a Processor Cabinet. Otherwise the 15m (50 ft) Link Cable #1810 should be used for greater distances. Prerequisites: A Link Controller (#1400). Field Installation: Yes.

**Mounting Location:**

#9001 - Under covers installation  
#9002 - Wall Mount

**Two Megabyte Memory (#1500):** (NO LONGER AVAILABLE) The Two Megabyte Memory feature provides memory control, error detection and correction for two megabyte of system memory. The feature also provides the system bus level checking and management logic required for the fault tolerant system operation. The feature is a two board package, requiring two CEC slots. Power for both boards is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. This feature must always be ordered in duplexed pairs (two #1500). Field Installation: Yes.

**Four Megabyte Memory (#1510):** The Four Megabyte Memory feature provides memory control, error detection and correction for

4MB of system memory. The feature also provides the system bus level checking and management logic required for the fault tolerant system operation. The feature is a three board package, requiring three CEC slots. Power for all boards is received on the lowest of the three boards, allowing the entire package to be powered from one of the duplexed system power supplies.

This feature must always be ordered in duplexed pairs (two #1510). Field Installation: Yes. A duplexed pair of Four Megabyte Memory Features is included as a standard feature in the 4575 Model 20B. The 4575 supports a maximum of 12MB of duplexed memory.

**Eight Megabyte Memory (#1530):** Provides memory control, error detection and correction for 8MB of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. The feature is a two-board package, requiring two CEC slots. Power is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. This feature must always be ordered in duplex pairs.

**Limitation:** The 4575 mdl 20B is configured with 4MB of duplexed memory. Additional memory features may be added by ordering duplexed pairs of feature #1510 (4MB) or #1530 (8MB). The 4575 mdl 20B has a maximum capacity of 12MB of duplexed memory. A maximum of two duplexed memory features may be installed in a 4575 mdl 20B. Field Installation: Yes.

**Cable Order:** The following cables and connectors are available from IBM for use with the 4575 by ordering the indicated feature numbers. These feature numbers are the only way that cables and connectors can be ordered.

For attachment of Full Modem Adapter to Modem:

#1801 - Full Modem Communication Cable - 7.5m (25 ft)

For attachment of asynchronous terminals to Direct Connect Adapters

#1802 - Direct Connect Communication Cable - 15m (50 ft)

#1803 - Direct Connect Communication Cable - 45.5m (150 ft)

#1804 - Direct Connect Communication Cable - 76m (250 ft)

#1806 - Direct Connect Cable for IBM Personal Computer - 7.5m (25 ft)

For inter-processor connection of System/88 processors

#1808 - Link Cable - 0.6m (2 ft)

#1809 - Link Cable - 3m (10 ft)

#1810 - Link Cable - 15m (50 ft)

#1811 - Link Cable - 30.5m (100 ft)

For terminal connections:

#1814 - Remote Terminal to Remote Modem Cable - 7.5m (25 ft)

#1815 - Synchronous Crossover Cable (Eliminates the need for modems for local Synchronous Devices) - 0.3m (1 ft)

#1816 - Asynchronous Crossover Cable (Eliminates the need for modems for local Asynchronous Devices) - 0.3m (1 ft)

For line printer

#1819 - Printer to Direct Connect Printer Adapter Cable - 15m (50 ft)

#1820 - Printer to Direct Connect Printer Adapter Cable (For connection to a customer supplies twinaxial extension cable for distances greater than 15m (50 ft) but less than 930m (3,000 ft) - 0.3m (1 ft)

**IBM** IBM Canada Ltd.

**MACHINES**

**M 4575.6**  
**MAY 87**

**MODEL CONVERSIONS (NONE)**

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 4576 PROCESSOR

### PURPOSE

The 4576 Processor is a System/88 High-Availability/Horizontal Growth processor available in seven models. Each 4576 Processor has 40 attachment slots for memory, processor, and controller boards. The 4576 comes standard with duplicate power supplies, equipped with battery backup for memory retention during brief power failures.

### MODELS

**Model 040:** A multiprocessor capable of executing 4 instruction streams simultaneously.

A Model 040 processor board contains two sets of four microprocessors to process system and application functions. All other components on a Model 040 board are also duplicated. As the primary four microprocessors are executing instructions, the other set of four microprocessors are executing exactly the same instructions. (Since the processor board is duplexed, there are two more sets of four microprocessors also executing the same instructions). The results produced by the two sets of four microprocessors are continuously compared. If a discrepancy in the results is detected, the entire processor board is taken out of service and the partner board continues to process in a simplex fashion until the defective board is replaced. Integrated checking and comparator logic on each processor board provides high levels of integrity.

Depending upon the mix of features installed, the Model 040 can support from 4 to 64Mb of duplexed memory, up to 256 communications ports, and up to 6.7Gb of duplexed direct access storage.

**Model 050:** Model 050 processor board contains four duplexed Motorola MC68020 microprocessors, capable of executing 4 instruction streams simultaneously to process system and application functions.

Each processor board is duplexed to provide fault tolerant function. Integrated checking and comparator logic on each processor board provides high levels of integrity. As the primary four microprocessors on a board are executing instructions, the other set of four microprocessors on the board are executing exactly the same instructions. (Since the processor board is duplexed, there are two more sets of four microprocessors also executing the same instructions.) The results produced by the two sets of four microprocessors are continuously compared. If a discrepancy in the results is detected, the entire processor board is taken out of service and the partner board continues to process in a simplex fashion until the defective board is replaced. The processor board can be replaced dynamically if a permanent failure occurs.

The Model 050 operates with the memory and controllers used on current models of the 4576 Processor and uses a 16-bit wide data and instruction path. The Model 050 chassis is designed to accommodate a 32-bit wide path and new memory features required by Models 081 through 084. This enables the Model 050 to be upgradable to a Model 081, 082, 083, or 084.

Depending upon the mix of features installed, the Model 050 can support from 8Mb to 64Mb of duplexed memory, up to a maximum of 256 communications ports, and up to 6.7Gb of duplexed direct access storage.

The Model 050 is source software compatible with other System/88 processors models.

**Model 060:** A multiprocessor capable of executing 6 instruction streams simultaneously.

A Model 060 processor board contains two sets of six microprocessors to process system and application functions. All other components on a Model 060 board are also duplicated. As the primary six microprocessors are executing instructions, the other set

of six microprocessors are executing exactly the same instructions. (Since the processor board is duplexed, there are two more sets of six microprocessors also executing the same instructions.) The results produced by the two sets of six microprocessors are continuously compared. If a discrepancy in the results is detected, the entire processor board is taken out of service and the partner board continues to process in a simplex fashion until the defective board is repaired and replaced. Integrated checking and comparator logic on each processor board provides high levels of integrity.

Depending upon the mix of features installed, the Model 060 can support from 8 to 64Mb of duplexed memory, up to 256 communications ports, and up to 6.7Gb of duplexed direct access storage. The Model 060 has a 48Kb high-speed memory cache, and separate on-board microprocessors for arithmetic assist for both floating point and packed decimal arithmetic functions.

**Models 081 through 084:** The processor board used in Models 081 through 084 contains one set of duplexed Motorola MC68020 microprocessors, which are enhanced through the use of an on-chip 16K by 32-bit data and instruction cache. There is also an on-chip 64 by 32-bit instruction cache. A tightly coupled Motorola MC68881 co-processor for each MC68020 provides high performance floating point arithmetic capabilities that supplements the MC68020 instruction set.

Each processor board is duplexed to provide fault tolerant function. Integrated checking and comparator logic on each processor board provides a high level of integrity. As the primary microprocessor on the board is executing instructions, the other microprocessor on the board is executing exactly the same instructions. The results produced by the two microprocessors are continuously compared. If a discrepancy in the results is detected, the entire processor board is taken out of service and the partner board continues to process in a simplex fashion until the defective board is repaired or replaced. The processor board can be replaced dynamically if a permanent failure occurs.

The architecture of Models 081 through 084 provides an expandable family of products. Upgrade of a Model 081, 082, or 083 to the next higher Model is accomplished by inserting an additional set of duplexed processor boards into the pre-allocated, pre-wired Central Electronic Complex (CEC) slots in the processor cabinet. This upgrade can be performed dynamically, without 're-booting' the processor module.

Models 081 through 084 use a new 32-bit wide memory which complements their high performance. The new memory uses 256K Dynamic RAM chips and has the ability to transfer up to 64-bits of data in a single cycle. Data is Error Correction Code protected. Single-bit errors are corrected and logged; double-bit errors are detected. Memory also is duplexed. The memory package can be replaced dynamically if a permanent failure occurs.

Depending upon the mix of features installed, Models 081 through 084 can support 8Mb to 64Mb of duplexed memory, up to 256 communications ports, and up to 6.7Gb of duplexed direct access storage.

Models 081 through 084 are source software compatible with other IBM System/88 processor models and provide an upgrade path for Model 050 customers.

**Model Specifics:** In mixture of applications, based on internal testing, performance can be the following:

# Physical Boards per Processor Set		# CEC Slots Required for Duplexed Processor Boards	
# Logical Processors		Performance Relative to Model 060	
4576			
Model	v	v	
050	4	1	2 Up to 0.90

081	1	1	2	Up to 0.75
082	2	2	4	Up to 1.5
083	3	3	6	Up to 2.0
084	4	4	8	Up to 2.5

060	6	3	6	1.0
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Additional performance data has been measured running an ET1 benchmark. The new Model 084 provides approximately 3 times the ET1 performance of the Model 060. An ET1 benchmark is one of the measures of performance in the high availability online transaction processing environment. The results reflect performance in a low physical I/O environment and do not necessarily provide information about balanced system performance. The ET1 benchmark consists of Debit/Credit transactions that may not represent any particular Debit/Credit environment. In addition, benchmark parameters and implementations vary from test to test. Therefore, the results of this benchmark should be used in conjunction with other inputs to make relative comparisons between different models and/or software releases of the System/88.

**Note:** Individual customer results may vary. The System/88 model performance for any one customer installation will depend on factors such as the number of users, their specific workload profiles, system capacity, and processor utilization.

#### Limitations:

**Model 050:** Of the 40 Central Electronic Complex (CEC) slots in the 4576 Processor cabinet, up to 36-slots may be used on the Model 050 for processor, memory, and controller boards.

**Models 081, 082, 083, and 084:** Of the 40 Central Electronic Complex (CEC) slots in the 4576 Processor chassis, up to 36-slots may be used on Model 081 through 084 for processor, memory, and controller boards. For example:

- An 8Mb Model 081 will use four CEC slots for duplexed memory and two CEC slots for one set of duplexed processor boards. Six more CEC slots are allocated and pre-wired for processor additions to allow upgrading to a Model 082, 083, or 084 when desired. Up to 24 CEC slots remain available for DASD, communications, tape, and link controllers, and for additional memory. In this configuration, the four remaining slots (of the total of 40 in the chassis) have no power connection and will remain unoccupied.
- A 64Mb Model 084 will use 12 CEC slots for duplexed memory and eight CEC slots for four sets of duplexed processor boards. Up to 16 CEC slots remain available for DASD, communications, tape, and link controllers. In this configuration, the four remaining slots (of the total of 40 in the chassis) have no power connection and will remain unoccupied.

#### HIGHLIGHTS

- Data Integrity
- Duplexed Components
- Hardware Implementation of Fault Tolerance
- Remote/Automatic Service
- Hot Plugability
- Customer-Replaceable Processors, Memory, and Controllers
- Parallel Processing
- Distributed Processing
- Horizontal Growth
- Vertical Growth

#### DESCRIPTION

Duplexed components (including processors, memory, direct access devices, and controllers) and hot plugability provide a fault tolerant environment completely transparent to programmers and end-users.

Multiple IBM System/88 processors can be interconnected to form an IBM System/88 System via the IBM System/88 Link facilities. Multiple System/88 Systems can be interconnected to form a Network using the System/88 Network facilities. This ability to inter-connect multiple System/88 processors and System/88 Systems together, while constantly maintaining a single system image, provides a system with significant horizontal growth capabilities.

Depending on mix of features installed, the 4576 has the capability of supporting the attachment of up to 256 communication ports, up to 6.7Gb of duplexed direct access storage, and 64Mb of duplexed main memory.

The 4576 Processor consists of an enclosure rack with duplexed power supplies, battery backup for memory retention during brief power failures, and 40 Central Electronic Complex (CEC) slots for processors, memory, and controllers. The 4576 Processor also contains rear rack space for Communications Chassis and Link Connectors. Every 4576 Processor requires a least one 4577 Expansion Cabinet.

- **Data Integrity:** Duplexed System/88 components and System/88 software help maintain data integrity. Data integrity is a standard feature integrated into the System/88 hardware and software. Data is ECC-protected and can correct a single-bit error and can also detect double-bit errors.
- **Duplexed Components:** Every major component (except tape) is duplexed or duplicated in a System/88 configuration. Duplexed processor boards, memory boards, and communications controller boards execute in synchronization, continually comparing results with their partner to maintain data integrity and to provide a backup in cases of component failure. Duplexed disk drives and controllers operate in synchronization under control of the operating system providing backup to each other in case of a failure. Duplicate Link Controllers and cabling components provide double the capacity of one link during normal operation and a backup link in the event of a failure.
- **Hardware Implementation of Fault Tolerance:** The System/88 provides fault tolerant processing by combining duplexed hardware components with logic circuitry that continually checks processor, memory, and controller boards for errors. This approach of continuous checking for operational and data errors provides for instantaneous detection of malfunctions, maintaining both operational and data integrity. The checking is generally implemented by duplexed circuitry contained on the board itself. Comparative logic circuits compare the results of duplicated components on the board.

If differences occur in a comparison, the failing board is taken out of service, without affecting system performance or operations, and forced into self-checking diagnostic mode.

- **Remote/Automatic Service:** The error detection functions described above automatically remove failing components from service. At removal time, diagnostics are automatically run on the failing component and the component is placed back into service if the failure does not recur. If the diagnostics determine that a CEC component has a permanent failure, the System/88 will automatically call the System/88 Support Center and report the problem for systems under warranty or covered by an IBM Maintenance Agreement. Automatic calls are also placed to the System/88 Support Center whenever limits are exceeded on soft CEC component failures.

The System/88 Support Center will diagnose the problem and, if required, express ship a replacement component to the customer site.

- **Hot Plugability:** This feature permits System/88 CEC components to be removed or replaced during full system operation

without affecting system operations or requiring power shut down. This feature allows most failing components to be repaired or replaced while complete system operation remains intact.

- **Customer-Replaceable Processors, Memory, and Controllers:** All CEC components (processor, memory, and controller boards) are Customer-Replaceable Units (CRU). That means when a hard failure occurs and a replacement component is received at the system site, there is no requirement for service personnel. A CRU can be replaced in minutes without special tools, and without system interruption.
- **Parallel Processing:** Multiple microprocessors in the Models 040, 050, 060, 082, 083, and 084 operate in parallel processing mode, and share the workload in a non-hierarchical fashion.
- **Distributed Processing:** Multiple System/88 Processor Modules can be inter-connected via the System/88 Link. This ability to inter-connect multiple System/88 modules while constantly maintaining a single system image of the available resources, provides a distributed processing environment transparent to the end-user.
- **Horizontal Growth:** Additional processors and their attached resources (i.e., memory, DASD, and peripherals) can be added to existing System/88 systems via the System/88 Link facility without interrupting system operations. Once the new processor is attached to the System/88 Link, all of its resources become available to the other processors within the System.
- **Vertical Growth:** System/88 architecture and design of Models 081 through 084 allow processor boards to be added to a Model 081, 082, or 083 to enable vertical processor growth when needed. The System/88 can grow from Model 050 to Model 081, 082, 083, or 084.

**Customer Responsibilities:** The customer is responsible for:

1. Understanding the management of the design, installation, and controlling of System/88 as described in the System/88 publications.
2. Designing and implementing user applications as necessary.
3. Carrying out approved problem determination and resolution in conjunction with the IBM System/88 Support Center.
4. Providing a data link to the IBM System/88 Support Center.
5. Installing service level updates and fixing as appropriate.
6. Operating the System/88 in a duplexed configuration.
7. Ensuring that the Personal Computer to be used as the system console has been set up prior to System/88 installation.

**Problem Determination:** Initial problem determination actions will be automatically performed by the System/88. If the System/88 is under a service contract or under warranty, failing CEC components will cause the System/88 to automatically notify the System/88 Support Center. When, as a result of a Customer Problem Analysis and Resolution (CPAR) procedure performed either automatically by the System/88 Support Center and/or on-site by the customer, if the identified failing unit is one of the Customer Replaceable Units (memory, processor, and controller boards), the customer will be informed that IBM will arrange pickup of the failing unit and delivery of a unit in good working order. The customer is responsible for removal of the failing unit, for the installation and verification of the delivered unit.

In all other cases, the customer may call an IBM Customer Engineering service number to request on-site assistance which will be provided at the applicable hourly rates and terms and conditions.

**Security, Auditability, and Control:** User management is responsible for evaluation, selection, and implementation of security features, for administrative procedures, and for appropriate controls in application systems.

If sensitive data is sent over external communication facilities, user management may wish to consider the application of cryptography.

**Configuration:** The System/88 and its associated I/O devices provide considerable flexibility and expandability. Contact your IBM Marketing Representative for assistance in developing a configuration that meets your application and performance needs.

**System Console Function:** An IBM Personal Computer or IBM Personal Computer XT, or their equivalent, must be used as the system console (monitor terminal) for each processor module in a System/88. Refer to the System/88 IBM Personal Computer Terminal Program Product (5732-019) for additional information and prerequisites.

Exchange, rather than repairing in place, is the recommended service philosophy for the Personal Computer to be used as the System Console.

The Personal Computer must be set up by the customer prior to System/88 installation.

#### Publications:

##### System and Operating System:

- SC34-0664 Introduction to the Operating System
- SA34-0302 Site Planning Guide
- SC34-0666 OS Commands
- SC34-0667 System Administrator's Guide
- SY34-0356 User's Maintenance Guide
- SC34-0694 The Analyze System Facility Guide

##### Data Communications:

- SC34-0667 Introduction to Communications
- SC34-0678 Communications Software: 3270 Support and 3270 Emulation Guide
- SC34-0679 Binary Synchronous Communication Guide
- SC34-0680 Using the Remote Job Entry Facility Guide
- SC34-0792 X.24/X.29 Networking Facility Guide
- SC34-0775 Synchronous Data Link Control Guide
- SC34-0757 Primary and Secondary SNA Planning and Operations Guide
- SC34-0758 Primary and Secondary SNA Programming Guide and Reference
- SC34-0759 APPC Planning and Operations Guide
- SC34-0759 APPC Programming Guide and Reference
- SL23-0156 System/88 Communications and System Management User's Guide

##### COBOL:

- SC34-0672 COBOL Language Reference
- SC34-0673 COBOL Subroutines Reference
- SC34-0674 Transaction Processing Services COBOL Supplement
- SC34-0675 Forms Management System COBOL Reference

##### C:

- SC34-0746 C Language Reference
- SC34-0819 C Subroutines Reference
- SC34-0747 Transaction Processing Services C Supplement
- SC34-0748 Forms Management System C Reference

##### PL/I:

- SC34-0669 PL/I Subroutines Reference
- SC34-0668 PL/I Language Reference
- SC34-0670 Transaction Processing Services PL/I Supplement
- SC34-0671 Forms Management System PL/I Reference

##### BASIC:

- SC34-0681 BASIC Language Reference
- SC34-0682 BASIC Subroutines Reference
- SC34-0683 Transaction Processing Services BASIC Supplement
- SC34-0684 Forms Management System BASIC Reference

##### FORTRAN:

- SC34-0685 FORTRAN Language Reference
- SC34-0686 FORTRAN Subroutines Reference
- SC34-0687 Transaction Processing Services FORTRAN Supplement
- SC34-0688 Forms Management System FORTRAN Reference

Pascal:

- SC34-0689 Pascal Language Reference
- SC34-0690 Pascal Subroutines Reference
- SC34-0691 Transaction Processing Services Pascal Supplement
- SC34-0692 Forms Management System Pascal Reference

ORACLE:

- GC34-0752 IBM System/88 ORACLE Licensed Program Specification
- SC34-0733 ORACLE User-Friendly Interface User's Guide
- SC34-0734 ORACLE Data Base Administrator's Guide
- SC34-0735 ORACLE COBOL Call Interface Reference
- SC34-0736 Introduction to ORACLE
- SC34-0737 ORACLE User-Friendly Interface Reference
- SC34-0738 ORACLE Interactive Application Facility Application Designer's Guide
- SC34-0739 ORACLE Interactive Application Facility Application Designer's Reference
- SC34-0740 ORACLE Interactive Application Facility Terminal Operator's Guide
- SC34-0741 ORACLE Interactive Application Facility Terminal Operator's Reference
- SC34-0742 ORACLE Report Generator
- SC34-0743 ORACLE Report Text Formatter
- SC34-0744 ORACLE Error Messages and Codes
- SC34-0745 ORACLE PL/1 Call Interface Reference
- SC34-0862 ORACLE Pre-Compiler Interface Reference
- SX34-0175 ORACLE Keyboard Aid

Miscellaneous:

- SC34-0693 Text Editor User's Guide
- SC34-0694 The Analyze System Facility Guide
- SX34-0169 Keyboard Aid/Template

SPECIFY

- Power cord: Standard 4.3m (14 ft). For Chicago area customer specify #9986 for 6-foot power cord. All devices within the Processor Cabinet are powered from the Processor Cabinet.
- Power (AC, 1-phase): Specify one of the following:

50 Hz	60 Hz
200V #2806	200V #2732
220V #2813	208V #9902
230V #2821	220V #2803
240V #2801	240V #9914

Each Processor cabinet and 4577 Expansion Cabinet require a separate power connection. The 4576 Processor is designed to operate in an environmental Class B facility and to meet country radiation, safety, and homologation standards. It is only available in Pearl White.

SPECIAL FEATURES

**4580 DASD Controller (#1000):** (NO LONGER AVAILABLE) This Direct Access Storage Device (DASD) Controller provides system control and management for the 142Mb 4580 Disk Drives. The controller interfaces directly to the 4580 Disk Drives. Each controller supports up to four 4580s and receives power from the S/88 processor. Each controller requires one CEC slot. The 4580 DASD Controllers must be ordered in duplexed pairs. Corequisite: A 4580 Disk Drive. Field Installation: Yes. Maximum: 6 duplexed pairs 4580 DASD Controllers (12 #1000) (NO LONGER AVAILABLE) can be

attached to the 4576, and a maximum of 48 physical 4580s can be spread across the controllers. Minimum: A System/88 processor module must be configured with a minimum of 1 duplexed pair of Disk Drives.

**4581 DASD Controller (#1010):** (NO LONGER AVAILABLE) This Direct Access Storage Device (DASD) Controller provides system control and management for the 448Mb 4581 Disk Drives. The controller interfaces to the 4581 DASD Director (#1011) which then interfaces to the 4581 Disk Drive. Each 4581 DASD Controller (#1010) (NO LONGER AVAILABLE) supports a maximum of eight 4581 DASD Directors (#1011) and receives its power from the S/88 Processor. Each 4581 DASD Controller (#1010) (NO LONGER AVAILABLE) requires one CEC slot. The 4581 DASD Controller (#1010) (NO LONGER AVAILABLE) must be ordered in duplexed pairs. Corequisite: A 4581 DASD Director (#1011). Field Installation: Yes. Maximum: 6 duplexed 4581 DASD Controller pairs (12 #1010) (NO LONGER AVAILABLE) can be attached to a 4576, and a maximum of 32 physical 4581s can be spread across the controllers. Minimum: A System/88 Processor Module must be configured with a minimum of 1 duplexed pair of Disk Drives.

**4580 DASD Controller (#1020):** (NO LONGER AVAILABLE) This direct access storage device (DASD) controller provides system control and management for the 142Mb 4580 Disk Drives. The controller interfaces directly to the 4580 Disk Drives. Each controller supports up to four 4580 Disk Drives. Each controller requires one Central Electronic Complex (CEC) slot. The 4580 DASD Controllers must be ordered in duplexed pairs. The corequisite for a controller is a 4580 Disk Drive. Field Installation: Yes. Maximum: 6 duplexed 4580 DASD Controllers can be attached to a 4576 Processor, and a maximum of 23 duplexed 4580 Disk Drives can be spread across the controllers. Minimum: Each System/88 processor module must be configured with at least 1 duplexed pair of disk drives.

**4581 DASD Controller (#1030):** This direct access storage device (DASD) controller provides system control and management for the 448Mb 4581 Disk Drives. The controller interfaces to the 4581 DASD Director Feature (#1011), which then interfaces to the 4581 Disk Drive. Each 4581 DASD Controller supports a maximum of eight 4581 DASD Directors. Each 4581 DASD Controller requires one CEC slot. The 4581 DASD Controllers must be ordered in duplexed pairs. The corequisite for a 4581 DASD Controller is a 4581 Disk Drive equipped with a DASD Director (#1011). Installed #1011s will operate with the new #1030 Controller without modification. Field Installation: Yes. Maximum: 6 duplexed 4581 DASD Controllers can be attached to a 4576 Processor, and a maximum of 15 duplexed 4581 Disk Drives can be spread across the controllers. Minimum: Each System/88 processing module must be configured with at least 1 duplexed pair of disk drives.

**4968 Streaming Tape Controller (#1100):** The Streaming Tape Controller provides system management and control for one 4968 Autoload Streaming Magnetic Tape Unit, Model 2AS. The controller cables directly to the 4968 tape drive. This controller is available as a simplex controller only. Each controller requires one CEC slot. Corequisite: A 4968 Autoload Streaming Magnetic Tape Unit, Model 2AS. Field Installation: Yes. Maximum: The System/88 supports a maximum of 4 tape controllers.

**4585 Streaming Tape Controller (#1110):** The Streaming Tape Controller provides system management and control for one IBM 4585 Autoload Magnetic Tape Unit, Model 001. The controller cables directly to the 4585 tape drive. The controller is available as a simplex controller only. Each controller requires one CEC slot. Corequisite: A 4585 Autoload Magnetic Tape Unit, Model 001. Field Installation: Yes. Maximum: The System/88 supports a maximum of 4 tape controllers.

**Communications Controller (#1200):** A duplexed pair of Communications Controllers supports a maximum of one Communication Adapter Chassis (#1220) and one Communications Adapter Expansion Chassis (#1230). With these two adapter chassis the duplexed communications controller pair can support up to 16 line adapters. These adapters can support combinations of asynchronous, binary synchronous, X.25, and SDLC lines. Each controller requires one CEC slot. Communications Controllers (#1200) must be ordered in duplexed pairs. Corequisites: Communications Adapter Chassis

(#1220) and at least one line adapter (#1201, #1202, #1203, #1204, #1205, #1206, or #1207). Field Installation: Yes. Maximum: 8 duplexed communications controller pairs (16 #1200) can be installed in a 4576.

**Full-Modem Asynchronous Line Adapter (#1201):** The Full-Modem Asynchronous Line Adapter provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 9.6K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communication Controller (#1200). Each port on the card provides the signals required for remote communications via a modem (using cable #1801). The adapter uses cable #1801 for attachment to external modem devices. The adapter can also be used in conjunction with a crossover cable (#1816) to provide direct connection of peripheral devices such as terminals and printers. The direct-connect capability can be achieved using either cable #1816 and #1806 for attaching to an IBM Personal Computer or a terminal with a male connector or #1816 plus #1802, #1803, or #1804 for attaching to a terminal with a female connector. Field Installation: Yes.

**Direct Connect Asynchronous Line Adapter (#1202):** The Direct Connect Asynchronous Line Adapter provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 9.6K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communication Controller (#1200). The adapter can be used with direct connect communication cables (#1802, #1803, #1804) providing for local attachment to terminals and printers with a female connector, or it can be used with the direct connect cable (#1806) for providing local attachment of The IBM Personal Computers. Field Installation: Yes.

**Direct Connect Printer Adapter (#1203):** The Direct Connect Printer Adapter provides one port for connection of a line printer. The adapter requires one slot in the Communications Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communications Controller (#1200). The adapter is used with direct connect twinaxial cable (#1819, #1820) for providing local attachment of the printer. For distances 15m (50 ft) or less, the Printer Connect Cable #1819 is required. Distances greater than 15m (50 ft) but less than 930m (3,000 ft) require the Printer Connect Cable #1820, 0.3m (1 ft), and a customer-supplied twinaxial extension cable. Field Installation: Yes. Twinaxial Cable Specifications: Refer to GA24-4028 for the 5262 or GA21-9337 for the 4245.

**Note:** When ordering the 5262 Line Printer for attachment to the System/88, use 5262 specify feature #9102 (Host Designation for System/88).

The System/88 Operating System (Release 2) supports the IBM 5262 Line Printer (Model 1) and the IBM 4245 Line Printer (Model T20) with the following print bands:

5262 Line Printer:

Character Set	Specify	
	A	B
48 International	#2767	#2950
63 International	#9523	#2950
64 International	#2768	#2950
96 International	#2770	#2950

4245 Line Printer:

48 International	#9520	#2950
63 International	#9522	#2950

**Remote Support Line/Clock Adapter (#1204):** The Remote Support Line/Clock Adapter provides one line port for the Support Modem (#1300) used for remote system support. This adapter also provides a battery-powered system clock that is accessed only during a module power-up. This adapter requires one slot and must be located in the last slot (slot #7) of the first Communication Adapter Chassis (#1220). Connection to the support modem is via a modem cable (cable #1801). Power is supplied to the adapter from the Communication Controller (#1200). One adapter (#1204) is required

per S/88 system. If multiple processor modules are interconnected via the Link Controller (#1400), only one adapter (#1204) is required. If more than one adapter (#1204) exists only one can be active in each S/88 system. Field Installation: Yes.

**High-Performance Full-Modem Synchronous Line Adapter (#1205):** The High-Performance Full-Modem Synchronous Line Adapter (#1205) provides one RS-232-C or RS-422 line port. The maximum bit rate is 56K bps. The adapter supports bisync, SDLC, and X.25 protocols and requires one slot in a Communication Adapter Chassis (#1220) or Expansion Chassis (#1230). Power for the adapter is supplied via the cables from the Communication Controller (#1200). Modem Cable #1801 is required for modem support. The adapter can also be used in conjunction with the Crossover Cable (#1815) or a customer-supplied RS-422 cable to provide direct connection of synchronous terminal devices. Field Installation: Yes.

**High-Performance Direct-Connect Asynchronous Line Adapter (#1206):** The High-Performance Direct-Connect Asynchronous Line Adapter (#1206) provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 19.2K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communication Controller (#1200). The adapter can be used with direct connect communication cables (cables #1802, #1803, #1804) providing for local attachment to terminals and printers with a female connector or with the direct-connect cable (#1806) for local attachment of the IBM Personal Computers. Field Installation: Yes.

**High-Performance Full-Modem Asynchronous Line Adapter (#1207):** The High-Performance Full-Modem Asynchronous Line Adapter (#1207) provides two RS-232-C asynchronous line ports. The maximum bit rate for each port is 19.2K bps. The adapter requires one slot in the Communication Adapter Chassis (#1220) or Expansion Chassis (#1230) and receives power from the Communications Controller (#1200). Each port on the card provides the signals required for remote communications via a modem (using cable #1801). The adapter can also be used in conjunction with the crossover cable (#1816) to provide direct connection of peripheral devices such as terminals and printers. The direct-connect capability can be achieved using either cable #1816 and #1806 for attaching to an IBM Personal Computer or a terminal with a male connector, or #1816 plus #1802, #1803, or #1804 for attaching to a terminal with a female connector. Field Installation: Yes.

**Communications Adapter Chassis (#1220):** Provides slots for attaching the communication line adapter cards. One chassis connects to a duplexed pair of Communications Controllers (2 #1200). Each chassis supports the attachment of up to 8 line adapter cards, (#1201, #1202, #1203, #1204, #1205, #1206, or #1207). A maximum of 7 of the cards can be high-performance adapter cards (#1203, #1205, #1206, or #1207). Power for Line Adapter Cards is provided by the Communications Controller (#1200) through the chassis. Connectors and fault indicators are provided for each slot in the Communication Adapter Chassis (#1220). Prerequisite: A duplexed pair of Communications Controllers (2 #1200). Field Installation: Yes. Maximum: A total of 4 Communications Adapter Chassis (#1220) and Communications Adapter Expansion Chassis (#1230) can be mounted in the rear rack of a 4576. The total of four can be 4 #1220s or a mix of #1220s and #1230s. A 4577 Expansion Adapter Chassis (#1220) or Communications Adapter Expansion Chassis (#1230).

**Communication Line Adapter to Communication Adapter Chassis (#1220) Assignment:** Specify Line Adapter feature type and quantity and Communication Adapter Chassis (#1220) sequence as #8XYZ:

where 'X' = the sequence number of the Communication Adapter Chassis (#1220) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet.

where 'Y' = the last digit (1 - 7) of the Communication Line Adapter feature number (#1201 - #1207).

where 'Z' = The quantity of that particular Communication Line Adapter Feature to be installed in this Communication Adapter Chassis (#1220).

A separate specify code is required for each feature type (#1201 - #1207) ordered for installation in this Communication Adapter Chassis (#1220).

For Example: An order that included 2 each - #1201, 1 each - #1202, 1 each - #1203, 2 each - #1205, for installation in the 2nd Communications Adapter Chassis (#1220) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet, would require the following Specify Codes:

#8212 (2 each - #1201)  
#8221 (1 each - #1202)  
#8231 (1 each - #1203)  
#8252 (2 each - #1205)

**Communications Adapter Expansion Chassis (#1230):** The Communication Adapter Expansion Chassis provides slots for an additional 8 communication Line Adapters, only 7 of which can be high-performance adapters. Power for line adapter cards located in the Communications Expansion Chassis (#1230) is provided by the Communication Controller (#1200) via the Communications Adapter Chassis (#1220). Connectors and fault indicators are provided for each slot in the chassis. Prerequisite: A duplexed pair of Communications Controllers (2 #1200) and a Communications Adapter Chassis (#1220). Field Installation: Yes. Limitations: Only 1 Communications Adapter Expansion Chassis can be connected to a Communications Adapter Chassis (#1220).

**Communication Line Adapter to Communication Adapter Expansion Chassis (#1230) Assignment:** Specify Line Adapter feature type and quantity and Communication Adapter Expansion Chassis (#1230) sequence as #9XYZ:

where 'X' = the sequence number of the Communication Adapter Expansion Chassis (#1230) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet.

where 'Y' = the last digit (1 - 7) of the Communication Line Adapter feature number (#1201 - #1207).

where 'Z' = the quantity of that particular Communication Line Adapter Feature to be installed in this Communication Adapter Expansion Chassis (#1230).

A separate specify code is required for each feature type (#1201 - 1207) ordered for installation in this Communication Adapter Expansion Chassis (#1230).

For Example: An order that included 2 each - #1201, 1 each - #1202, 1 each - #1203, 2 each - #1205, for installation in the 2nd Communications Adapter Expansion Chassis (#1230) on a 4575 or 4576 Processor or a 4577 Expansion Cabinet, would require the following Specify Codes:

#9212 - (2 each - #1201)  
#9221 - (1 each - #1202)  
#9231 - (1 each - #1203)  
#9252 - (2 each - #1205)

**Link Controller (#1400):** The Link Controller provides control and management for the local intra-system communication. The controller interfaces directly to the Link Connector (#1410) via the Link Cables #1808, #1809, #1810, or #1811, or customer-supplied cables. The controller provides transmit and receive protocol management for the 1.4Mb serial interface. The controller requires one CEC slot. Link controllers must be ordered as duplex pairs so that a single failure will not prevent inter-processor communication. The continuous aggregate bandwidth of an operational pair of controllers approaches 2.8Mb per second for the duplexed pair.

Only 1 Link Controller pair (2 #1400) is required to attach a processor module to the S/88 Link, hence 1 Link Controller pair (2 #1400) is the maximum that can be configured on a S/88 processor. Field Installation: Yes.

**Link Connector (#1410):** The Link Connector is a passive device that provides cable connection points for the interconnection of up to six Link Controllers (#1400) on a S/88 Link. Attachment of more than six Link Controllers (#1400) to a S/88 Link requires the interconnection of two or more Link Connectors (#1410) in series. Each additional Link Connector (#1410) attached to the S/88 Link requires a cable connection point on the Link Connector (#1410) it is being at-

tached to, a 4591 Link Extender Model 001 and one of its own cable connection points. All Link hardware components (Controllers, Connectors, Extenders, and Cables) must be ordered in pairs to achieve fault tolerant operation.

A fully configured S/88 System, consisting of 32 Link-connected Processor Modules, requires 32 Link Controller pairs (64 #1400), 8 Link Connector pairs (16 #1410), 7 4591 Link Extender pairs (14 4591 Link Extenders Model 001) and associated cable pairs. The Link Connector can be mounted in the rear rack of a S/88 Processor Cabinet or the front or rear rack of a 4577 Expansion Cabinet. Duplex Link Connectors (#1410) should be installed in adjacent processor positions. The maximum distance between a Link Controller (#1400) and Link Connector (#1410), without the use of the 4591 is 750 feet. Link Connectors (#1410) should be installed in the Processor Modules closest to the physical center of the S/88 Link structure to minimize cabling requirements. Additional processors can be added dynamically to the Link, providing on-line growth to the link structure without impacting function. The 2-foot Link Cable (#1808) is used within the S/88 Processor Cabinet that houses the Link Connector (#1410) for connection between that processor's Controllers (#1400) and Connectors (#1410). The 10-foot Link Cable (#1809) is used if the Link Connector (#1410) is located in a 4577 Expansion Cabinet Model 001 adjacent to a Processor Cabinet. Otherwise the 15m (50 ft) Link Cable (#1810) should be used for greater distances. Prerequisite: A Link Controller (#1400). Field Installation: Yes.

Specify Mounting Location:

#9001 - Under covers installation  
#9002 - Wall Mount

**2Mb Memory (#1500):** (NO LONGER AVAILABLE) The 2Mb Memory feature provides memory control, error detection and correction for 2Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault tolerant system operation. The feature is a two board package, requiring two CEC slots. Power for both boards is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. This feature must always be ordered in duplexed pairs (2 #1500) (NO LONGER AVAILABLE). The 4576 Processor supports a maximum of 64Mb of duplexed memory. Field Installation: Yes.

**4Mb Memory (#1510):** The 4Mb Memory feature provides memory control, error detection and correction for 4Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault tolerant system operation. The feature is a 3-board package, requiring three CEC slots. Power for all boards is received on the lowest of the three boards, allowing the entire package to be powered from one of the duplexed system power supplies. This feature must always be ordered in duplexed pairs (2 #1510). The 4576 Processor supports a maximum of 64Mb of duplexed memory. Field Installation: Yes.

**8Mb Memory (#1530):** Provides memory control, error detection and correction for 8Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. The feature is a 2-board package, requiring two CEC slots. Power is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. This feature must always be ordered in duplex pairs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor Models 040 and 060. A maximum of 24Mb is supported if feature #1530 is mixed with feature #1500 (NO LONGER AVAILABLE) or #1510. Maximum: 4 memory features (duplexed) on a 4576 Processor. Field Installation: Yes.

**16Mb Memory Feature (#1540):** Provides memory control, error detection and correction for 16Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. The feature is a 3-board package, requiring three CEC slots. Power for all boards is received on the lowest of the three boards, allowing the entire package to be powered from one of the duplexed pairs. Limitations: 64Mb duplexed memory on the 4576 Processor Models 040 and 060 feature #1540 may not be intermixed with memory features #1500

## MACHINES

(NO LONGER AVAILABLE) or #1510. A maximum of 24Mb is supported if feature #1530 is mixed with feature #1500 (NO LONGER AVAILABLE) or #1510. Maximum: 4 memory features (duplexed) on a 4576 Processor Models 040 and 060. Field Installation: Yes.

**8Mb Memory With Controller (#1581) (NO LONGER AVAILABLE):** Memory feature #1581 (NO LONGER AVAILABLE) is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1581 (NO LONGER AVAILABLE) provides memory control, error detection and correction for 8Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It is a 2-board package, requiring two CEC slots. Power is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. The package can be replaced dynamically if a permanent failure occurs. This feature must always be ordered in duplex pairs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor Models 081, 082, 083, or 084. Feature #1581 (NO LONGER AVAILABLE) cannot be used in Model 040, 050, or 060. Feature #1581 (NO LONGER AVAILABLE) cannot be mixed with feature #1510, #1530, or #1540. Maximum: 2 sets of duplexed memory features on 4576 Processor Models 081, 082, 083, or 084. Field Installation: Yes.

**16Mb Memory With Controller (#1582) (NO LONGER AVAILABLE):** Memory feature #1582 (NO LONGER AVAILABLE) is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1582 (NO LONGER AVAILABLE) provides memory control, error detection and correction for 16Mb of system memory. This feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It is a 2-board package, requiring two CEC slots. Power for all boards is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. The package can be replaced dynamically if a permanent failure occurs. This feature must always be ordered in duplex pairs. Limitations: 64Mb duplexed memory maximum on the 4576 Processor Models 081, 082, 083, or 084. Feature #1582 (NO LONGER AVAILABLE) cannot be used with Models 040, 050, or 060. Feature #1582 (NO LONGER AVAILABLE) may not be intermixed with memory features #1510, #1530, or #1540. Maximum: 2 sets of duplexed memory features on 4576 Processor Models 081, 082, 083, or 084. Field Installation: Yes.

**32Mb Memory With Controller (#1583) (NO LONGER AVAILABLE):** Memory feature #1583 (NO LONGER AVAILABLE) is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1583 (NO LONGER AVAILABLE) provides memory control, error detection and correction for 32Mb of system memory. This feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It is a 3-board package, requiring three CEC slots. Power for all boards is received on the lowest of the three boards, allowing the entire package to be powered from one of the duplexed system power supplies. The package can be replaced dynamically if a permanent failure occurs. This feature must always be ordered in duplex pairs. Limitations: 64Mb duplexed memory maximum on the 4576 Processor Models 081, 082, 083, or 084. Feature #1583 (NO LONGER AVAILABLE) cannot be used with Models 040, 050, or 060. Feature #1583 may not be intermixed with memory features #1510, #1530, or #1540. Maximum: 2 sets of duplexed memory features on 4576 Processor Models 081, 082, 083, or 084. Field Installation: Yes.

**8Mb Memory with Controller (#1591):** Memory feature #1591 is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1591 provides memory control, error detection and correction for 8Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It requires one CEC slot. The board can be replaced dynamically if a permanent failure occurs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor models 081, 082, 083 or 084. Feature #1591 cannot be used in Models 040, 050 or 060, and

it cannot be mixed with feature #1510, #1530, #1540, #1581 (NO LONGER AVAILABLE), #1582 (NO LONGER AVAILABLE), or #1583 (NO LONGER AVAILABLE). Feature #1591 can be mixed with feature #1592 and #1593. The feature must always be ordered in duplex pairs. Maximum: Four pairs of memory features (any combination of #1591, #1592 and #1593), up to a maximum of 64Mb of duplexed memory, occupying up to eight powered central electronic complex (CEC) slots, may be installed on Models 081, 082, 083 and 084. Field Installable: Yes.

**16Mb Memory with Controller (#1592):** Feature #1592 is provided for ease of ordering. The feature consists of two #1591 8Mb memory features, and requires two CEC slots. A pair of duplexed #1592 features consists of four #1591 features.

**32Mb Memory with Controller (#1593):** Memory feature #1593 is a 32-bit wide memory which uses 1Mb Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1593 provides memory control, error detection and correction for 32Mb of system memory. This feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It requires one CEC slot. The board can be replaced dynamically if a permanent failure occurs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor models 081, 082, 083 or 084. Feature #1593 cannot be used in Models 040, 050 or 060, and it cannot be mixed with feature #1510, #1530, #1540, #1581 (NO LONGER AVAILABLE), #1582 (NO LONGER AVAILABLE), or #1583 (NO LONGER AVAILABLE). Feature #1593 can be mixed with feature #1591 and #1592. The feature must always be ordered in duplex pairs. Maximum: Four pairs of memory features (any combination of #1591, #1592 and #1593), up to a maximum of 64Mb of duplexed memory, occupying up to eight powered central electronic complex (CEC) slots, may be installed on Models 081, 082, 083 and 084. Field Installable: Yes.

**Cable Order:** The following cables and connectors are available from IBM for use with the 4576 Processor by ordering the indicated feature numbers. These feature numbers are the only way that cables and connectors can be ordered.

For attachment of Full-Modem Adapter to Modem:

- #1801 Full-Modem Communication Cable 7.5m (25 ft)

For attachment of asynchronous terminals to Direct Connect Adapters:

- #1802 Direct-Connect Asynchronous Communication Cable 15m (50 ft)
- #1803 Direct-Connect Asynchronous Communication Cable 45.5m (150 ft)
- #1804 Direct-Connect Asynchronous Communication Cable 76m (250 ft)
- #1806 Direct-Connect Asynchronous Cable for IBM Personal Computer 7.5m (25 ft)

For inter-processor connection of S/88 processors:

- #1808 Link Cable 0.6m (2 ft)
- #1809 Link Cable 3m (10 ft)
- #1810 Link Cable 15m (50 ft)
- #1811 Link Cable 30.5m (100 ft)

For terminal connections:

- #1814 Remote Terminal to Remote Modem Cable 7.5m (25 ft)
- #1815 Synchronous Crossover Cable 0.3m (1 ft) (eliminates the need for Modems for Synchronous Devices)
- #1816 Asynchronous Crossover Cable 0.3m (1 ft) (eliminates the need for modems for Asynchronous Devices)

For attachment of line printer:

- #1819 Printer to Direct-Connect Printer Adapter Cable 15m (50 ft)
- #1820 Printer to Direct-Connect Printer Adapter Cable 0.3m (1 ft) (for connection to a customer-supplied twinaxial extension cable for distances greater than 15m (50 ft)).

**MODEL CONVERSIONS**

Model 040 can be upgraded to 4576 Model 060.

Model 050 can be upgraded to the following 4576 models:

- Model 050 to 081
- Model 050 to 082
- Model 050 to 083
- Model 050 to 084

Model 081 through 083 can be upgraded to the following 4576 models:

- Model 081 to 082
- Model 081 to 083
- Model 081 to 084
- Model 082 to 083
- Model 082 to 084
- Model 083 to 084

**MACHINES**

Model 081, 082, 083, and 084 customers may upgrade installed memory features to 16Mb or 32Mb memory features as follows.

- From #1581\* (8Mb) to #1582\* (16Mb)
- From #1581\* (8Mb) to #1583\* (32Mb)
- From #1582\* (16Mb) to #1583\* (32Mb)

**Note:** \* (NO LONGER AVAILABLE)

Parts removed or replaced become the property of IBM and must be returned.

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

**M 4576.8**  
**SEP 87**

# **4576 PROCESSOR MODELS 081, 082, 083, 084 AND MEMORY FEATURES #1591, #1592, AND #1593 - PRODUCT SPECIFICATIONS**

## **DESCRIPTION**

The IBM System/88 High-Availability, fault tolerant 4576 Processor now includes Models 081, 082, 083, and 084. The new models incorporate Motorola MC68020 microprocessors, a 32-bit wide data and instruction path, an on-board 16K by 32-bit data and instruction cache, and an on-chip 64 by 32-bit instruction cache. Each microprocessor has an MC68881 co-processor that provides high-performance floating point arithmetic capabilities. Three new 32-bit wide main memory features, which use 256K Dynamic RAM (DRAM) chips, complement the high-performance design of Models 081 through 084.

## **HIGHLIGHTS**

- Duplexed Motorola MC68020 microprocessors
- Fully implemented 32-bit technology
- An on-board 16K by 32-bit cache and an on-chip 64 by 32-bit cache
- MC68881 floating point co-processor for each Motorola MC68020
- Improved price/performance over other System/88 processors
- Source software compatible with other System/88 processors
- Vertical growth path from Model 081 to Model 084
- Three new, 32-bit wide, memory features (8Mb, 16Mb, 32Mb), which use 256K DRAM chips

## **MODELS**

**Models 081 through 084:** The processor board used in Models 081 through 084 contains one set of duplexed Motorola MC68020 microprocessors, which are enhanced through the use of an on-board 16K by 32-bit data and instruction cache. There is also an on-chip 64 by 32-bit instruction cache. A tightly-coupled Motorola MC68881 co-processor for each MC68020 provides high-performance floating point arithmetic capabilities that supplements the MC68020 instruction set.

Each processor board is duplexed to provide fault tolerant function. Integrated checking and comparator logic on each processor board provides a high level of integrity. As the primary microprocessor on the board is executing instructions, the other microprocessor on the board is executing exactly the same instructions. The results produced by the two microprocessors are continuously compared. If a discrepancy in the results is detected, the entire processor board is taken out of service and the partner board continues to process in a simplex fashion until the defective board is repaired or replaced. The processor board can be replaced dynamically if a permanent failure occurs.

The architecture of Models 081 through 084 provides an expandable family of products. Upgrade of a Model 081, 082, or 083 to the next higher model is accomplished by inserting an additional set of duplexed processor boards into the pre-allocated, pre-wired Central Electronic Complex (CEC) slots in the processor cabinet. This upgrade can be performed dynamically, without 're-booting' the processor module.

Models 081 through 084 use a new 32-bit wide memory which complements their high performance. The new memory uses 256K Dynamic RAM chips and has the ability to transfer up to 64-bits of data in a single cycle. Data is Error Correction Code protected. Single-bit errors are corrected and logged; double-bit errors are

detected. Memory also is duplexed. The memory package can be replaced dynamically if a permanent failure occurs.

Depending upon the mix of features installed, Models 081 through 084 can support 8Mb to 64Mb of duplexed memory, up to 256 communications ports, and up to 6.7Gb of duplexed direct access storage.

Models 081 through 084 are source software compatible with other IBM System/88 processor models and provide an upgrade path for Model 050 customers.

**Model Specifics:** In mixture of applications, based on internal testing, performance can be the following:

# Physical Boards per Processor Set		# CEC Slots Required for Duplexed Processor Boards		Performance Relative to Model 060	
# Logical Processors					
4576 Model	v	v	v		
050	4	1	2	Up to	0.90
081	1	1	2	Up to	0.75
082	2	2	4	Up to	1.5
083	3	3	6	Up to	2.0
084	4	4	8	Up to	2.5
060	6	3	6		1.0

Additional performance data has been measured running an ET1 benchmark. The new Model 084 provides approximately 3 times the ET1 performance of the Model 060. An ET1 benchmark is one of the measures of performance in the high availability online transaction processing environment. The results reflect performance in a low physical I/O environment and do not necessarily provide information about balanced system performance. The ET1 benchmark consists of Debit/Credit transactions that may not represent any particular Debit/Credit environment. In addition benchmark parameters and implementations vary from test to test. Therefore, the results of this benchmark should be used in conjunction with other inputs to make relative comparisons between different models and/or software releases of the System/88.

**Note:** Individual customer results may vary. The System/88 model performance for any one customer installation will depend on factors such as the number of users, their specific workload profiles, system capacity, and processor utilization.

## **SPECIAL FEATURES**

Special features currently available for the 4576 Processor Models 040 and 060, except for memory features #1510 (4Mb), #1530 (8Mb), and #1540 (16Mb), are now available for the 4576 Models 081 through 084. The new memory features announced for the Models 081, 082, 083, and 084 are described below.

Memory may be increased on installed Models 081 through 084 by ordering additional memory features or a Memory Upgrade. Increasing memory via a Memory Upgrade results in a savings of CEC slots when compared to adding memory features. For more information, see the section "Model Conversions".

**8Mb Memory with Controller (#1581) (NO LONGER AVAILABLE):** Memory feature #1581 (NO LONGER AVAILABLE) is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1581 (NO LONGER AVAILABLE) provides memory control, error detection and correction for 8Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It is a 2-board package, requiring

two CEC slots. Power is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. The package can be replaced dynamically if a permanent failure occurs. This feature must always be ordered in duplex pairs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor Models 081, 082, 083, or 084. Feature #1581 (NO LONGER AVAILABLE) cannot be used in Model 040, 050, or 060. Feature #1581 (NO LONGER AVAILABLE) cannot be mixed with feature #1510, #1530, or #1540. Maximum: 2 sets of duplexed memory features on 4576 Processor Models 081, 082, 083, and 084. Field Installation: Yes.

**16Mb Memory with Controller (#1582) (NO LONGER AVAILABLE):** Memory feature #1582 (NO LONGER AVAILABLE) is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1582 (NO LONGER AVAILABLE) provides memory control, error detection and correction for 16Mb of system memory. This feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It is a 2-board package, requiring two CEC slots. Power for all boards is received on the lower of the two boards, allowing the entire package to be powered from one of the duplexed system power supplies. The package can be replaced dynamically if a permanent failure occurs. This feature must always be ordered in duplex pairs. Limitations: 64Mb duplexed memory maximum on the 4576 Processor Models 081, 082, 083, or 084. Feature #1582 (NO LONGER AVAILABLE) cannot be used with Models 040, 050, or 060. Feature #1582 (NO LONGER AVAILABLE) may not be intermixed with memory features #1510, #1530, or #1540. Maximum: 2 sets of duplexed memory features on 4576 Processor Models 081, 082, 083, or 084. Field Installation: Yes.

**32Mb Memory with Controller (#1583) (NO LONGER AVAILABLE):** Memory feature #1583 (NO LONGER AVAILABLE) is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1583 (NO LONGER AVAILABLE) provides memory control, error detection and correction for 32Mb of system memory. This feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It is a 3-board package, requiring three CEC slots. Power for all boards is received on the lowest of the three boards, allowing the entire package to be powered from one of the duplexed system power supplies. The package can be replaced dynamically if a permanent failure occurs. This feature must always be ordered in duplex pairs. Limitations: 64Mb duplexed memory maximum on the 4576 Processor Models 081, 082, 083, or 084. Feature #1583 (NO LONGER AVAILABLE) cannot be used with Models 040, 050, or 060. Feature #1583 (NO LONGER AVAILABLE) may not be intermixed with memory features #1510, #1530, or #1540. Maximum: 2 sets of duplexed memory features on 4576 Processor Models 081, 082, 083, or 084. Field Installation: Yes.

**8Mb Memory with Controller (#1591):** Memory feature #1591 is a 32-bit wide memory which uses 256K Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1591 provides memory control, error detection and correction for 8Mb of system memory. The feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It requires one CEC slot. The board can be replaced dynamically if a permanent failure occurs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor models 081, 082, 083 or 084. Feature #1591 cannot be used in Models 040, 050 or 060, and it cannot be mixed with feature #1510, #1530, #1540, #1581 (NO LONGER AVAILABLE), #1582 (NO LONGER AVAILABLE), or #1583 (NO LONGER AVAILABLE). Feature #1591 can be mixed with feature #1592 and #1593. The feature must always be ordered in duplex pairs. Maximum: Four pairs of memory features (any combination of #1591, #1592 and #1593), up to a maximum of 64Mb of duplexed memory, occupying up to eight powered central electronic complex (CEC) slots, may be installed on Models 081, 082, 083 and 084. Field Installable: Yes.

**16Mb Memory with Controller (#1592):** Feature #1592 is provided for ease of ordering. The feature consists of two #1591 8Mb memory features, and requires two CEC slots. A pair of duplexed #1592 features consists of four #1591 features.

**32Mb Memory with Controller (#1593):** Memory feature #1593 is a 32-bit wide memory which uses 1Mb Dynamic RAM (DRAM) technology and has 32/64-bit interleaved access. Feature #1593 provides memory control, error detection and correction for 32Mb of system memory. This feature also provides the system bus level checking and management logic required for the fault-tolerant system operation. It requires one CEC slot. The board can be replaced dynamically if a permanent failure occurs. Limitations: 64Mb maximum duplexed memory on the 4576 Processor models 081, 082, 083 or 084. Feature #1593 cannot be used in Models 040, 050 or 060, and it cannot be mixed with feature #1510, #1530, #1540, #1581 (NO LONGER AVAILABLE), #1582 (NO LONGER AVAILABLE), or #1583 (NO LONGER AVAILABLE). Feature #1593 can be mixed with feature #1591 and #1592. The feature must always be ordered in duplex pairs. Maximum: Four pairs of memory features (any combination of #1591, #1592 and #1593), up to a maximum of 64Mb of duplexed memory, occupying up to eight powered central electronic complex (CEC) slots, may be installed on Models 081, 082, 083 and 084. Field Installable: Yes.

**Operating and Power Controls:** Power can be turned off with the power on/off switch provided on Operator Control Panel.

#### Physical Characteristics:

##### Dimensions:

Front - 600mm (23.5 in.)  
Side - 1,029mm (40.5 in.)  
Height - 1,360mm (53.375 in.)  
Weight - 272kg (max.) (600 lbs. (max.))

Heat Output: 11,000 BTU/Hour

##### Power Requirements:

4 KVA (50 Hz and 60 Hz) (max.)  
3-phase (50 Hz and 60 Hz)

**Usability Characteristics:** The Operator Control Panel on 4576 Models 081 through 084 provides the interface to system control functions such as starting and stopping the module, booting the module and module status indicator lights. The Control Panel also contains a 16-character LCD display which provides module level status and error conditions.

**Specified Operating Environment:** The IBM System/88 and related software comprise a mid-range fault-tolerant systems offering which is applicable in many online application environments where customers require high availability or continuous operations capability. Application software is currently available from non-IBM sources for many applications, including automatic teller machine/point-of-sale switching, cash management, bank teller, and warehouse inventory tracking. See "IBM System/88 Software Solutions Catalog", GA34-0801, for details.

Model 081 through 083 provides a vertical growth path for IBM System/88 users. Model 081 through 083 can be upgraded by inserting an additional pair of processors into predetermined slots in the Central Electronic Complex (CEC).

**Limitations:** Of the 40 Central Electronic Complex (CEC) slots in the 4576 Processor chassis, up to 36 slots may be used on Model 081 through 084 for processor, memory, and controller boards. For example:

- An 8Mb Model 081 will use 4 CEC slots for duplexed memory and 2 CEC slots for one set of duplexed processor boards. 6 more CEC slots are allocated and pre-wired for processor additions to allow upgrading to a Model 082, 083, or 084 when desired. Up to 24 CEC slots remain available for DASD, communications, tape, and link controllers, and for additional memory. In this configuration, the 4 remaining slots (of the total of 40 in the chassis) have no power connection and will remain unoccupied.
- A 64Mb Model 084 will use 12 CEC slots for duplexed memory and 8 CEC slots for 4 sets of duplexed processor boards. Up to 16 CEC slots remain available for DASD, communications, tape, and link controllers. In this configuration, the 4 remain-

ing slots (of the total of 40 in the chassis) have no power connection and will remain unoccupied.

**Programming requirements:** Release 3 of the IBM System/88 Operating System is required.

## 4577 EXPANSION CABINET

### PURPOSE

The 4577 Expansion Cabinet for the System/88 provides dual A.C. power distribution and a standard 19-inch rack chassis for rack mountable units, such as 4580 and 4581 Disk Drives, 4968 and 4585 Tape Drives, Communication Adapter Chassis (#1220) and Expansion Chassis (#1230). Link Connectors (#1410) may also be mounted in a 4577 Expansion Cabinet if necessary. The 4577 attaches via its Air Plenum to the 4575 Processor, the 4576 Processor, or another 4577 Expansion Cabinet. Power sequencing for the 4577 is via the power control provided in the 4575 or 4576 Processor. Multiple 4577s can be connected to a 4575 or 4576 Processor.

### MODELS

Model 1 001

### HIGHLIGHTS

**Prerequisites:** 4575 Processor or 4576 Processor.

**Publications:** "Site Planning Guide", SA34-0302

**Cable Orders:** All cables and connectors required to attach the 4577 to the System/88 are supplied with the shipment of the 4577.

### SPECIFY

- Power Cord: Standard 4.3m (14 ft.). For Chicago area customer specify #9986 for a 6 ft. power cord. All devices within

a 4577 Expansion Cabinet are powered from the 4577 Expansion Cabinet and must be ordered with the same voltage as the 4577.

- Power (AC, 1-phase): Specify one of the following:

50 Hz		60 Hz	
200V	#2806	120V	#9911
220V	#2813	200V	#2732
230V	#2821	208V	#9902
240V	#2801	220V	#2803
		240V	#9914

### SPECIAL FEATURES

Where Communications Adapter Chassis (#1220) and Communications Adapter Expansion Chassis (#1230) are located within the 4577, the same Communication Line Adapter to Communication Adapter Chassis Assignment for the 4575 or 4576 will apply.

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 4580 DISK DRIVE

### PURPOSE

The 4580 is a 142MB direct access storage device for the System/88 that is rack mounted directly in a 4575 or 4577 cabinet. Two 4580s can be mounted in the 4575 Processor Cabinet and up to six can be mounted in a single 4577 Expansion Cabinet. The 4580 is designed to operate in parallel with a partner 4580. Any unrecoverable errors on the 4580 causes the unit to be automatically taken out of service and processing continues with the disk's partner device without interrupting system operations. 4580 assemblies can be replaced without interrupting System/88 operations.

When a replaced 4580 assembly is brought back into service, system management routines automatically bring the unit up to date to a point where it is an exact image of its partner. The data transfer rate for the 4580 is 1.04 MB/sec.

- | A maximum of 16 duplexed 4580s can be attached to a 4575. A 4576 can attach a maximum of 24 duplexed 4580s.

### MODELS

#### Model 1 001

#### Prerequisites:

- | ● 4575 Processor or a 4576 Processor with a 4577 Expansion cabinet
- Disk Controller Feature #1020

**Maximum:** A maximum of four 4580s can be attached to each 4580 DASD Controller Feature (#1020).

### HIGHLIGHTS

- Formatted with 2048 byte fixed length sectors to optimize the speed of data handling.
- Rack Mountable - two units can be mounted in a 4575 processing module cabinet and up to six can be mounted in a 4577 expansion cabinet.
- Hot Plugability - duplexed drives can be taken off-line, serviced, replaced, added without impacting system operations.
- Self contained maintenance routines continually monitor units for operational errors.
- Architected for mirrored operations with a partner 4580.

#### Publications: System and Operating System:

- "Introduction to the Operating System" SC34-0664
- "OS Reference" SC34-0665
- "Site Planning Guide" SA34-0302
- "OS Commands" SC34-0666
- "User's Maintenance Guide" SY34-0356

#### Technical Specifications:

Cylinders	1121
Tracks per Cylinder	7
Sectors per Cylinder	62
Bytes per Sector	2048
Data transfer rate	1.04 MB/sec
Average Seek Time	40 ms
Average Rotational Delay	9.7 ms
Average Access Time	49.7 ms

**Cable Orders:** All cables and connectors required to attach the 4580 to the System/88 are supplied with the shipment of the 4580. Power for the 4580 is supplied from the Processor Cabinet or 4577 Expansion Cabinet that houses the 4580.

### SPECIFY

- Power (AC, 1-phase): The voltage specified must be the same as the voltage of the 4575 or the 4577 in which the 4580 will be located. Specify one of the following:

50 Hz	60 Hz
200V #2806	120V #9911
220V #2813	200V #2732
230V #2821	208V #9902
240V #2801	220V #2803
	240V #9914

Disk Drive to DASD Controller Assignment Specify.

- For each 4580 ordered, specify one: #9XXY

where XX = sequence number of DASD Controller (#1020) on a 4575 or 4576 processor. ("XX" can be a number with range of 01 to 08 for DASD Controller sequences on a 4575, and "XX" can range from 01 to 12 for DASD Controller sequences on a 4576 Processor.)

and where Y = sequence number of this 4580 attached to its DASD Controller (#1020) that was identified as "XX" above. "Y" can range from 1 to 4.

For Example: A 4580 that will be connected to the fourth DASD Controller (#1020) on a 4575 or 4576 Processor and that will be the second 4580 attached to this fourth controller, will have a specify code of #9042.

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 4581 DISK DRIVE

### PURPOSE

The 4581 is a 448MB direct access storage device for the System/88 that is rack mounted directly in the 4577 Expansion Cabinet Model 1. The 4581 is designed to operate in parallel with a second partner 4581. Any unrecoverable errors on the 4581 causes the unit to be automatically taken out of service and processing continues with the disk's partner device without interrupting system operation. 4581 assemblies can be replaced without interrupting System/88 operations. When a replaced 4581 assembly is brought back into service, system management routines automatically bring the unit up to date to a point where it is an exact image of its partner. The data transfer rate for the 4581 is 1.8 MB/sec.

A maximum of 16 duplexed 4581s can be attached to each 4575 Processor and a maximum of 15 duplexed 4581s can be attached to a 4576 Processor. A maximum of four (4) 4581s and associated 4581 DASD Directors (#1011) can be installed in one 4577 Expansion Cabinet model 1.

### MODELS

(Canada only > Model 1 001 <)

Model 2 002

**Prerequisites:** Hardware Requirements:

- The 4581 requires a 4581 DASD Director Feature (#1011) for each 4581 configured and a 4575 or 4576 Processor with the 4581 DASD Controller Feature (#1030) installed, and an attached 4577 Expansion Cabinet model 1.

**Maximum:** A maximum of eight 4581s can be attached to each 4581 DASD Controller (#1030).

### HIGHLIGHTS

- Formatted with 2048 byte fixed length sectors to optimize the speed of data handling.
- Hot Plugability - duplexed drives can be taken off-line, serviced, replaced, or added without impacting system operation.
- Self contained maintenance routines continually monitor units for operational errors.
- Architected for mirrored operations with a partner 4581.

### Technical Specifications:

Cylinders	842
Tracks per Cylinder	20
Sectors per Cylinder	260
Bytes per Sector	2048
Data transfer rate	1.8 MB/sec
Average Seek Time	18 ms
Average Rotational Delay	7.5 ms
Average Access Time	25.5 ms

**Publications:** System and Operating System:

- SC34-0664 "Introduction to the Operating System"

- SC34-0665 "OS Reference"
- SA34-0302 "Site Planning Guide"
- SC34-0666 "OS Commands"
- SY34-0356 "User's Maintenance Guide"

**Cable Order:** All cables and connectors required to attach the 4581 to the System/88 are supplied with the shipment of the 4581. Power for the 4581 is provided from the 4577 Expansion Cabinet that houses the 4581.

### SPECIFY

- Power (AC, 1-phase): The voltage specified for the 4581 must be the same as the voltage for the 4577 in which it will be located. Specify one of the following:

50 Hz	60 Hz
200V #2806	120V #9911
220V #2813	200V #2732
230V #2821	208V #9902
240V #2801	220V #2803
	240V #9914

Disk Drive to DASD Controller Assignment Specify.

- For each 4581 ordered, specify one: #9XXY

where XX = sequence number of DASD Controller (#1030) on a 4575 or 4576 Processor. ("XX" can be a number with range of 01 to 06 for DASD Controller sequences on a 4575, and "XX" can range from 01 to 12 for DASD Controller sequences on a 4576 Processor.)

and where Y = sequence number of this 4581 attached to its DASD Controller (#1030) that was identified as "XX" above. "Y" can range from 1 to 8.

For example: A 4581 that will be connected to the fourth DASD Controller (#1030) on a 4575 or 4576 Processor and that will be the second 4581 attached to this fourth controller, will have a specify code of #9042.

### SPECIAL FEATURES

**The 4581 Direct Access Storage Device (DASD) Director (#1011):** Provides interface control between the 4581 DASD Controller (#1030) and the 448MB 4581s. Each 4581 DASD Director supports one 4581. The 4581 DASD Director requires rear rack space in the 4577 Expansion Cabinet model 1 and must be mounted directly behind its associated 4581. Prerequisite: The 4581 DASD Controller #1030. Maximum: A maximum of eight 4581 DASD Directors can be attached to a 4581 DASD Controller (#1030).

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 4585 AUTOLOAD STREAMING MAGNETIC TAPE UNIT

### PURPOSE

The 4585 Autoload Streaming Magnetic Tape Unit provides fast, convenient save/restore capabilities to System/88s having medium to large disk capacities as well as magnetic tape processing capabilities. The 4585 tape formats are ANSI compatible 1600 bpi PE, ANSI compatible 6250 bpi GCR, and 3200 bpi PE. The 4585 Streaming Tape Controller (#1110) is the 4585 attachment board, which mounts in the System/88 Central Electronic Complex (4575 or 4576) processor cabinet.

### MODELS

#### Model 1 001

**Limitations:** There are no special features.

**Maximum:** A maximum of four per System/88 processing module may be installed.

**Prerequisites:** A 4575 processor and a 4577 Expansion Cabinet or a 4576 processor and a 4577 Expansion Cabinet are required as a prerequisite. The 4585 and 4585 Streaming Tape Controller (#1110) are co-requisite. Refer to the M4575 or 4576 pages.

**Customer Setup (CSU):** Is not a customer setup machine.

### HIGHLIGHTS

- The 4585 has streaming capability for save/restore, and through an internal cache, offers response time typical of start/stop devices.
- Up to four 4585 model 001s and four tape controllers per System/88 processing module.
- Tape formats are: 6250 bpi GCR, 3200 bpi PE, 1600 bpi PE
- The 4585 is compatible with IBM 3420 tape drives and IBM 4968 tape units.
- The key parameters of save/restore are speed, capacity and convenience. The 4585 has these attributes:
  - Speed: When reading or writing to tape, the 4585 tape speed is 100 ips in 1600 bpi mode, 70 ips in 6250 bpi mode, and 50 ips in 3200 bpi mode. These speeds apply to both streaming save/restore and start/stop processing modes.
  - Capacity: Each 2,400 foot tape reel has an unformatted capacity of approximately 40MB in 1600 bpi mode, 80MB in 3200 bpi mode, and 170MB in 6250 bpi mode.
  - Convenience: Autoload eliminates tape threading by the operator. Autoload plus large per reel capacity make operator convenience a key 4585 highlight. The autoload mechanism features self-seating, self-locking tape hub and tape reel upside-down detect.

### DESCRIPTION

The 4585 Autoload Streaming Magnetic Tape Unit offers both start/stop processing and streaming tape save/restore. Tape for-

mat is ANSI compatible 1600 bpi PE and 6250 bpi GCR. The 4585 also writes 3200 bpi PE.

The 4585 Streaming Tape Controller (#1110) provides system management and control for one 4585. The controller cables directly to the 4585 tape drive. The controller is available as a simplex controller only. The controller receives power directly from the System/88 processor module. Each controller mounts in the processor and requires one Central Electronic Complex (CEC) slot. Co-requisite for a controller is a 4585 model 001.

The 4585 and the 4968 Autoload Streaming Magnetic Tape Unit, attached to their respective controllers, may coexist on any System/88 processing module in any mixture not exceeding a total of four tape units.

**Publications:** The following publications are shipped with the product.

- "IBM System/88, 4585 Tape Unit Guide" (SX34-1001)
- "IBM System/88, 4585 Autoload Streaming Magnetic Tape Unit Maintenance Manual" (SY34-0500)

### SPECIFY

Electrical power for the 4585 is provided by the 4577 Expansion Cabinet. The 4585 voltage specified must match the voltage of the 4577 it is mounted in. Electrical power for the 4585 Streaming Tape Controller (#1110) is provided by the 4575 Processor or the 4576 Processor.

- Voltage (AC, 1-phase):

	50 Hz	60 Hz
200V	#2806	120V #9911
220V	#2813	200V #2732
230V	#2821	208V #9902
240V	#2801	220V #2803
		240V #9914

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES

Two tape reels will be shipped with the 4585. One tape is for maintenance and diagnostic use by the IBM service representative. The second tape is for customer use. Tape reel sizes used with the 4585 are 7, 8.5, and 10.5 inches in diameter. Only IBM Multi System Tapes (P/N 6842028) or equivalent tapes certified for 6250 bpi should be used.

A tape cleaning kit (P/N 352465) is shipped with the tape unit.

## 4591 LINK EXTENDER

### PURPOSE

The 4591 is an active device (signal booster) that can be used to extend the distance limitation between Link connected System/88 processor modules or can be used to increase the total number of processors that can be interconnected through the use of Link Connectors (#1410). The 4591 Link Extender allows an additional 1500 feet of Link cable between it and a 4575 Processor, a 4576 Processor, or another 4591 Link Extender. Multiple 4591s may be connected in series to achieve greater distances. System/88 configurations requiring the interconnection of more than six (6) Processor Modules will need two or more Link Connectors (#1410) that must use Link Extenders between them. For duplexed Link operations, a second 4591 is required at each 4591 location. The cable length from a Link Connector to a 4591 must not exceed 750 feet. The Link Extender must not be mounted inside the 4575 or 4576 Processor Cabinet or the 4577 Expansion Cabinet.

### MODELS

Model 1 001

#### Prerequisites:

- Multiple 4575 or 4576 Processors
- Link Connector Feature #1410.

#### Publications: System and Operating System:

- SC34-0664 "Introduction to the Operating System"
- SC34-0665 "OS Reference"
- SA34-0302 "Site Planning Guide"

- SC34-0666 "OS Commands"
- SC34-0667 "System Administrator's Guide"
- SY34-0356 "User's Maintenance Guide"
- SC34-0694 "The Analyze System Performance Guide"

**Cable Order:** Cables for use with the 4591 are ordered as features of the 4575 or 4576 Processor. These feature numbers are the only way that cables and connectors can be ordered.

### SPECIFY

- Power (AC, 1-phase): Specify one of the following:

50/60 Hz	
120V	#9911
220V	#2803

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 4683 POINT OF SALE TERMINAL

### PURPOSE

The 4683 is a user-programmable terminal for the 4680 Store System. It provides, under application program control, the ability to process point of sale transactions, data collection, credit authorization, price look-up and other inquiry and data entry functions. The 4683 Model 1 and Model 2 (when attached to the Model 1) can continue most sales functions under application program control when disconnected from the 5170 Personal Computer AT/Store Controller.

### MODELS

Two models of the 4683 Point of Sale Terminals are supported under the 4680 Store System.

**Model 1 001:** Comprised of a base unit with 1,024K bytes of base storage, a microprocessor, and cable receptacles that will allow the basic point of sale input and output units to be cable-attached. The base also has two slots that allow feature expansion options to be added that increases the number of input and output devices that can be attached. The 4683 Model 1 terminal communicates with the 5170 Personal Computer AT/Store Controller via a high-speed store loop at 38.4K bps.

**Model 2 002:** Comprised of a base unit with the same input and output attachment capability of the 4683 Model 1. The 4683 Model 2 terminal must be cable attached to the 4683 Model 1 and is dependent on the 4683 Model 1 terminal for processing and storage.

**Note:** The 4683 Model 2 terminal may also be attached directly to an IBM Personal Computer, IBM Personal Computer XT, IBM Personal Computer AT, and IBM Personal System/2 Model 30 when the IBM 4683 Attachment Adapter Kit is installed in one of the above system units.

See limitations #2 (below) for the 4683 Model 2 when attached to the 4683 Attachment Adapter Kit.

**Limitations #1:** The following limitations apply when the 4683 Models 1, A01 and 2 are installed for use with the 5170 Personal Computer AT/Store Controller.

1. Only one 4683 Model 2 terminal can be attached to a 4683 Model 1 terminal.
2. The 4683 Model 2 can be attached up to 150m (500 ft) from the Model 1.
3. Only two Feature Expansion options may be set-up on a 4683 Model 1 or 2.
4. Up to 64 4683 Model 1 terminals may be attached by store loop wiring to an 5170 Store Controller.
5. Loop cable distances are allowed up to 1,220m (4,000 ft) between 4683 Model 1 terminals that are powered on.
6. The devices that can be attached to the terminals are:

### Maximum Attachments

	Base Unit Attachments	Maximum Unit	See Note
#3320	50-Key Modifiable Keyboard	1	
#3322	Alphanumeric Keyboard	1	
#3339	Shopper Display	1	2
#4010	Magnetic Stripe Rdr	1	1
#3343	40-Character		

	Alphanumeric Display	2	2
#3340	Operator Display	2	2
#3360	Cash Drawer with Fixed Till	1	3
#3361	Cash Drawer with Adjustable Till	1	3
#3380	Printer	1	
3687-002	3687 Scanner Model 002	1	
1520	Hand Held Scanner Model A02 1520-A02	1	
#4000	Feature Expansion A	1	4
#4001	Feature Expansion B	2	4
#4002	Feature Expansion C	2	4
#4003	Feature Expansion D	2	4

### Extended Attachments

- 127mm (5 inch) Monochrome Display\*
  - Feature Expansion Option A (#4000): 2 (2)
- 300mm (12 inch) Monochrome Display #3354
  - Feature Expansion Option A (#4000): 2 (2)
- 346 (14 inch) Color Display #3352
  - Feature Expansion A (#4000): 2 (2)
- Non-IBM OCR Hand-Held Reader Cable #4024
  - Feature Expansion Option B (#4001): 1
  - Feature Expansion Option C (#4002): 1
  - Feature Expansion Option D (#4003): 1
- Non-IBM Scale Cable #4026 (5)
  - Feature Expansion Option B (#4001): 1
  - Feature Expansion Option C (#4002): 1
- Non-IBM Coin Dispenser Cable #4028 (5)
  - Feature Expansion Option B (#4001): 1
  - Feature Expansion Option C (#4002): 1
  - Feature Expansion Option D (#4003): 1
- Asynchronous Comm. Cable - RS-232-C (#4020)
  - Feature Expansion Option C (#4002): 1
  - Feature Expansion Option D (#4003): 1
- Asynchronous Comm. Cable - RS-232-C or Current Loop (#4022)
  - Feature Expansion Option C (#4002): 1
  - Feature Expansion Option D (#4003): 1
- Magnetic Wand Reader (#4016)
  - Feature Expansion Option D (#4003): 1

\* See "Accessories" section.

### Notes:

1. Magnetic Stripe Reader #4010 attaches to the 50-Key Modifiable Keyboard (#3320).
2. A maximum of four displays may be attached to a 4683 with the following restrictions and combinations of video and non-video displays.
  - A maximum of two video displays may be attached to a 4683 in any combination. The video displays include the 346mm (14 inch) Color Display and the previously announced 127mm (5 inch) and 300mm (12 inch) monochrome displays. Note that Feature Expansion A (#4000) is required for each video display attached.
  - A maximum of two non-video type displays can be attached to a 4683 in any combination. The non-video displays include the Shopper Display and the previously announced 40-Character Alphanumeric Display and the Operator Display.

The above combinations have the following restrictions:

- A maximum of one Shopper Display may be attached. The Shopper Display is designed as a second display, therefore, one of the other non-video or video displays must be used as the system interface to the operator.

- Combinations of the 40-Character Alphanumeric Display and the 127mm (5 inch) monochrome display is limited to three, and a fourth display cannot be attached.
- 3. A maximum of 2 cash drawers may be attached in any combination of features #3360 and #3361.
- 4. Any combination of Feature Expansion options is allowable except Feature Expansion D (#4003) which is limited to one per 4683 Model 1 or 2.
- 5. The Non-IBM OCR Hand Held Reader Cable (#4024) and Non-IBM Scale Cable are mutually exclusive on the same Feature Expansion Option.

**Limitations #2:** The following limitations apply when the 4683 Model 2 is attached to the 4683 Attachment Adapter Kit installed in the system unit of an IBM Personal Computer, IBM Personal Computer XT, IBM Personal Computer AT, and IBM Personal System/2 Model 30.

- 1. Only two 4684 Model 2 terminals can be attached to the 4683 Attachment Adapter Kit.
- 2. The 4683 Model 2 can be attached up to 122m (400 ft.) from the 4683 Attachment Adapter Kit installed in the System Unit.
- 3. The devices that can be installed on a 4683 Model 2 when attached to the 4683 Attachment Adapter Kit are:

Base Unit Attachment	Feature Code	Maximum Unit	Note
50 Key Modifiable Keyboard	#3320	1	
Magnetic Stripe Reader	#4010	1	1
40 Character Alphanumeric Display	#3343	2	
Cash Drawer with Fixed Till	#3360	2	2
Cash Drawer with Adjustable Till	#3361	2	2
Printer	#3380	1	
1520 Hand Held Scanner	1520-A02	1	

Note 1: The Magnetic Stripe Reader (#4010) attaches to the 50-Key Modifiable Keyboard (#3320).

Note 2: A Maximum of 2 cash drawers may be attached in any combination of features #3360 and #3361.

**Warranty Period:** 3 months.

**Warranty Service:** Warranty service is a Customer Carry-In Exchange (CCE) and is provided under the Agreement for Purchase of IBM Machines WWW.

**Warranty Option:** IBM On-Site Exchange (Specify #9799) and Customer On-Site Exchange (Specify #9826) are available for the applicable Warranty Option Charge under the IBM Maintenance Agreement.

**Prerequisites:**

- 1. A 5170 Personal Computer AT/Store Controller provides the control function for the 4683 Model 1 terminal.
- 2. A 50-Key Modifiable Keyboard or Alphanumeric Keyboard and either an Operator Display, a 40-Character Alphanumeric Display, a 127mm (5 inch) Monochrome Display, a 300mm (12 inch) Monochrome Display, or a 346 (14 inch) Color Display are required on the 4683 Models 1 and 2.

- 3. A base unit cable, either #4030, #4032 or #4034, is required with the 4683 Model 2.

**Proposal/Acknowledgement Letter Statements:** Each Proposal and Acknowledgement Letter must include the following statement:

"It is agreed that IBM will have no responsibility to provide warranty or maintenance service on any 4683 which contains cash or other valuables. It will be the customer's responsibility to remove, control, and replace cash or other valuables so that IBM can fulfill its warranty and maintenance obligations."

**Customer Setup:** The 4683 will be shipped with customer setup instructions. The customer is responsible for:

- 1. Unpacking, placement, setup and checkout of the 4683 at the time of delivery or when relocating the 4683.
- 2. Relocation of the 4683 (if required) to allow IBM service access.
- 3. Using and following the 4683 Problem Determination Procedures.

**HIGHLIGHTS**

- The 4683 is a user-programmable point of sale terminal for use with the 4680 Store System. Under application program control, the terminal provides the ability to process point of sale transactions, collect data, authorize credit, look up prices, and process other inquiry and data entry functions. The 4683 Model 1 and Model 2 (when attached to the 4683 Model 1) can continue many sales functions, under application program control, when disconnected from the 5170 Personal Computer AT/Store Controller.
- The Model 1 includes a base unit with 1,024K bytes of storage, a microprocessor, and cable receptacles that allow attachment of basic point of sale input and output devices. In addition, the base unit contains two slots for the installation of feature expansion options to which additional input/output devices can be attached. The 4683 Model 1 communicates with the 5170 Store Controller via a high-speed store loop at 38.4K bps.
- The Model 2 includes a base unit and has the same input/output attachment capability as the Model 1. The Model 2 must be cable attached to the Model 1 and is dependent on the Model 1 for processing and storage. The 4683 Model 2 can be attached to an IBM Personal Computer, IBM Personal Computer XT, IBM Personal Computer AT, and IBM Personal System/2 Model 30.
- The Model 1 base control unit contains a customer replaceable, rechargeable battery and a charger that maintain the 1,024K bytes of storage for up to 15 minutes if the power source is interrupted. The data and programs retained will allow transaction restart if power is returned during the battery retention period. In addition, data and programs are maintained through a power supply trickle charge feature. This feature will power storage, independent of the terminal on/off switch position, as long as the 4683 is plugged into a powered wall receptacle.
- Both models include 2,048 bytes of storage with long-term storage retention by a long-life battery. The 2,048 bytes of storage is used to store vital terminal and customer data including totals. 1,024 bytes of this storage is reserved for customer application use.
- The basic point of sale I/O units that can be attached to the base control unit of both models include a keyboard, cash drawers, printer, and displays. These units can be attached in either an integrated or distributed configuration. The base unit of both models also allows the attachment of a 3687 Checkout Scanner Model 2 and a 1520 Hand-Held Scanner Model A02. A magnetic stripe reader may be mounted on and attached to the keyboard.
- Additional I/O devices can be attached to both models by the customer setup feature expansion options. These devices in-

clude a 127mm (5 inch) Monochrome Display, a 300mm (12 inch) Monochrome Display, or a 346 (14 inch) Color Display, a magnetic wand reader, a non-IBM scale, coin dispenser, cash drawer or external alarm, and a non-IBM OCR hand-held reader or a 1520 Hand-Held Scanner Model A01. Other devices can be attached through an Asynchronous Communication Interface - RS-232-C depending on the feature expansion options used.

## Customer Responsibilities:

1. The customer must provide (purchase, install, and maintain) all the necessary 4680 loop wiring lines and data connectors within the store for the 1) loop, and 2) the connection of a 4683 Model 1 to a 4683 Model 2 if the cable distances exceed 20m (66 ft). Refer to the following publications for detail wiring information.
  - "IBM 4680 Store System: Preparing Your Site", GA27-3692
  - "IBM Cabling System Planning and Installation Guide", GA27-3361
  - "IBM Cabling System Catalog", G570-2040
  - "IBM 4680 Store System: Selecting Hardware and Software Components" GA27-3691
  - "Using the IBM Cabling System with Communication Products", GA27-3620
2. The customer is responsible for using the IBM-provided Problem Determination Procedures for identifying a failing unit.
3. The encoding of the magnetic stripe on credit cards and employee badges contains data-integrity formats and check characters. This does not imply, however, that they are not subject to fraud techniques. Implementing of any additional data security is the responsibility of the customer.
4. The customer is responsible for obtaining and maintaining any non-IBM required devices or furniture needed to complete a checkout environment beyond those elements supplied by IBM.
5. A keypad extractor is shipped with each keyboard to aid in the removal of keytops if required.
6. Due to the flexibility of this system, program and data security are the responsibility of the customer.
7. The customer will be responsible for setup and removal of all cables.

**Environment:** The 4680 Store System is designed for store environments where heating and cooling facilities are provided as required by geographical location. See "IBM 4680 Store System - Preparing Your Site", GA27-3692 for detailed information on environmental criteria for the 4683 and the 5170 Personal Computer/AT Store Controller.

**Maintenance:** 4683 terminals located in the immediate sales area may preclude online service due to the public scrutiny and loss of the selling location for customer service. In these cases, the customer should remove the failing terminal to a service facility located within the store. At this location the customer can determine the failing element and test the terminal online through a customer-provided store loop receptacle.

**Publications:** The following publications are available for the 4680 Store System and the IBM Cabling System:

- "IBM 4680 Store System: Planning Guide", GC30-3362
- "IBM 4680 Store System: Selecting Hardware and Software Components", GA27-3691
- "IBM 4680 Store System: Preparing your Site", GA27-3692
- "IBM Cabling System Planning and Installation Guide", GA27-3361
- "IBM Cabling System Catalog", G570-2040
- "Using the IBM Cabling System with Communication Products", GA27-3620

- "A Building Planning Guide for Communication Wiring", G320-8059

**Note:** For customers with installed 4680 Systems, the revised version of the "IBM 4680 Store System: Messages, Symptoms, and Problem Resolution Guide" (SC30-3358-2) may be ordered as of September 25, 1987. The revised version is applicable to Release 1, 2 and 3 of the IBM 4680 Operating System.

**Bibliography:** GC20-0370

**Ordering Information:** Orders for any quantity may be taken by a Marketing Representative and will be processed on AAS by the branch office.

## SPECIFY

- (Canada only > Voltage (120V AC, 1-phase, 3-wire, 60 Hz): For each 4683 specify one of the following power cords:
  - #9512, 4.3m (14 ft) with locking plug, P/N 7842130
  - #9510, 4.3m (14 ft) with non-locking plug, P/N 6952296 <)

- Voltage (AC, 1-phase):  
50 and 60 Hz

Low-Voltage 100-127V AC #2900; High-Voltage 200-240V AC #2901

**Note:** A power cord and plug will be shipped with each 4683 base unit and 300mm (12 inch) Monochrome Display. The country code will be used to select power, language and nomenclature. Only countries that wish to order other than their own must use a specify code.

**Note:** 100-127V AC, 60 Hz is compatible with existing 115V systems.

- Machine Nomenclature:

Canadian English #2934  
Canadian French #2935  
English US #2950  
Spanish #2931

- Lock Inserts: Specify one of the following lock inserts for each Printer (#3380), Cash Drawer (#3360 or #3361) or 50-Key Modifiable Keyboard (#3320) ordered. Each of the above devices is shipped with a lock insert housing installed. A lock insert or a non-operating lock insert must be specified. These lock inserts are installed during customer setup using a master lock insert key which is shipped with each 5170 PC AT/Store Controller. The master lock insert key is also used to remove and replace lock inserts after the initial customer setup. Customers should retain the master lock insert key for future use.

Specify #9201 for a Lock Insert that will randomly be selected when a designated lock combination is not required. Two keys will be shipped with each lock insert.

Specify Codes #9202 through #9221 are specific lock inserts and must be ordered when designated lock combination is required. Two keys will be shipped with each lock insert.

#9202 #9206 #9210 #9214 #9218  
#9203 #9207 #9211 #9215 #9219  
#9204 #9208 #9212 #9216 #9220  
#9205 #9209 #9213 #9217 #9221

Specify #9223 for a non-operating lock insert if a key operated lock is not required.

**Note:** Lock inserts are not covered under the IBM Maintenance Agreements. See "Accessories" section for replacement part ordering instruction.

## SPECIAL FEATURES

Unless otherwise excluded, all special features apply to both the 4683 Model 1 and Model 2.

**50-Key Modifiable Keyboard (#3320):** Provides a keyboard that can be arranged in a variety of key layouts using customer-legendable keys. The keyboard is shipped with single keybuttons installed but without the lens (key tops) installed.

Keyboard legend sheets in several colors with common legends will be shipped with the 4683 Model 1 and Model 2 base units. Refer to "IBM 4680 Store System: Selecting Hardware and Software Components" (GA27-3691), for detail of the legend sheet nomenclature.

All single function keys are under user-program control. Vertical double keys can be created by using a double key lens. The standard height keybuttons may be replaced with raised keybuttons. If fewer keys are desired, the keybuttons of any vertical row of 5 function keys can be removed and a shield installed to cover the unused keys. The keyboard can be used in an integrated or distributed configuration. The keyboard includes:

- 2 system function keys with legends
- 11 engraved numeric keys in a keypad arrangement
- 37 single function keys
- 1 key-button removal device
- 1 ship group that includes:
  - 45 standard height single lens
  - 12 raised single lens
  - 10 standard height double lens
  - 4 raised double lens
  - 3 standard keybuttons
  - 18 raised keybuttons
  - 2 key shield
  - 1 engraved \* keybutton

The keyboard includes a managers override keylock (see "Specify" section for lock insert ordering instructions). Prerequisite: Either the Integrated (#3325) or Distributed (#3326) Keyboard Attachment Cable. Limitation: Mutually exclusive with Alphanumeric Keyboard (#3322). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Note:** See "Accessories" for additional keybuttons, lens, and legend sheets.

**Alphanumeric Keyboard (#3322):** Provides an 84-key alphanumeric keyboard that includes alphanumeric keys, a numeric keypad in an adding machine arrangement, 16 function keys, an audible alarm and a managers override keylock. The function keys are customer relegendable and the key nomenclature may be customer defined for functions dependent on the application. The keyboard includes:

- Standard alphanumeric keys in a typewriter-like format
- 10 function keys that have legends installed, two of which are system function keys
- Six unlegended keys
- 10-key keypad in a fixed data entry format
- Managers keylock
- Four terminal status indicators
- An audible alarm having three tone frequencies and two loudness levels under program control
- Ship group that includes a keytop puller and a legend sheet with 60 legends. The legend sheet consists of two colors of 30 legends each, with seven legends preprinted in each color.

The keyboard can be used in an integrated or distributed configuration. (See the "Specify" section for lock insert ordering instruction.) Prerequisite: Either the Integrated (#3325) or Distributed (#3326) Keyboard Cable. Limitation: Cannot be used with the 50-key Modifiable Keyboard (#3320). Maximum: One. Customer Setup: Yes.

**Integrated Keyboard Cable (#3325):** Provides a cable for use when the Keyboard (#3320) is to be positioned on top of the base control

unit in an integrated configuration. Prerequisite: 50-Key Modifiable Keyboard (#3320) or Alphanumeric Keyboard (#3322). Maximum: One. Limitation: Mutually exclusive with Distributed Keyboard Cable (#3326). Field Installation: Yes. Customer Setup: Yes.

**Distributed Keyboard Cable (#3326):** Provides a 3.8m (12.5 ft) cable for use when the keyboard and base control unit are to be distributed. This cable is also required to attach to the 1520 Model A02. Prerequisite: 50-Key Modifiable Keyboard (#3320) or Alphanumeric Keyboard (#3322) or 1520 Model A02. Maximum: Two. One keyboard and one 1520 Model A02 can be attached. Limitation: Mutually exclusive with Integrated Keyboard Cable (#3325). Field Installation: Yes. Customer Setup: Yes.

**Key-Button Kit-Retail Format (#3330):** Provides an engraved set of numeric keybuttons with dual legends for the retail environment. These keybuttons can be substituted for the standard numeric keybuttons. See the "IBM 4680 Store System: Selecting Hardware and Software Components" manual (GA27-3691) for legend details. Prerequisite: 50-Key Modifiable Keyboard (#3320). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Shopper Display (#3339):** Provides a display with one row of eight numeric characters and six function indicators for shopper viewing. An attachment cable, brackets and a pedestal are shipped with the display that will allow the display to be mounted in an integrated configuration. Prerequisite: Display Extension Cable (#3342) for distributed configurations. Limitation: This display must be used with a display that can function as a system display, either the 40-Character Alphanumeric (#3343), the Operator Display (#3340) or one of the Video Displays: 127mm (5 inch) (Accessory), 300mm (12 inch) (#3354) or the 346mm (14 inch) (#3352) Color Display. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Operator Display (#3340):** Provides a display with two rows of 20 alphanumeric character positions for terminal operator viewing. The display can display numeric and alphanumeric data such as item number, description and guidance information. Characters are formed using a 5 x 7 dot matrix. Mounting brackets shipped with the display allow the display to be mounted on the keyboard or on a standalone mount. An integrated cable is part of the display. Prerequisite: An Extension Cable (#3342) is required for distributed configurations. Limitation: This display can be used alone or with additional displays such as a second Operator Display, the Shopper Display, the 40-Character Alphanumeric Display, the 127mm (5 inch) Monochrome Display, the 300mm (12 inch) Monochrome Display or the 346mm (14 inch) Color Display. The Operator Display cannot be mounted on the 50-Key Modifiable Keyboard or the Alphanumeric Keyboard with the Magnetic Stripe Reader. Maximum: Two. Customer Setup: Yes.

**Display Extension Cable (#3342):** A 2.8m (9 ft) extension cable for use when the Operator Display (#3340) or the Shopper Display (#3339) and the 4683 base control unit are to be distributed. Prerequisite: Shopper Display (#3339) or Operator Display (#3340). Maximum: Two. Customer Setup: Yes.

**40-Character Alphanumeric Display (#3343):** Provides a 40-character operator/customer display consisting of two rows of 20 characters each. Character formation uses a dot matrix. It displays both numeric and alphanumeric data such as item number, description and guidance information. A mounting pedestal, which allows the display to tilt and rotate for optimum viewing, is provided. The display can be used in an integrated or distributed configuration. Prerequisites: Either the Integrated (#3344) or Distributed (#3345) Alphanumeric Display Cable. Limitation: This display can be used alone or with additional displays: a second 40-Character Alphanumeric Display, the Operator Display, the Shopper Display, the 127mm (5 inch) Monochrome Display, or the 300mm (12 inch) Monochrome Display or the 346mm (14 inch) Color Display. Maximum: Two. Field Installation: Yes. Customer Setup: Yes.

**Integrated Alphanumeric Display Cable (#3344):** Provides a cable for use when the 40-Character Alphanumeric Display is to be positioned on top of the 4683 base control unit in an integrated configuration. Prerequisite: 40-Character Alphanumeric Display (#3343). Maximum: One per 40-Position Alphanumeric Display. Limitation: Mutually exclusive with a Distributed Alphanumeric Display Cable

(#3345). Maximum: Two. Field Installation: Yes. Customer Setup: Yes.

**Distributed Alphanumeric Display Cable (#3345):** Provides a 3.8m (12.5 ft) cable for use when the 40-Character Alphanumeric Display and 4683 base unit are to be distributed. A short display mounting pedestal for use in a distributed configuration is shipped with this cable. Prerequisite: 40-Character Alphanumeric Display (#3343). Maximum: Two. Limitation: Mutually exclusive with an Integrated Alphanumeric Display Cable (#3334). Field Installation: Yes. Customer Setup: Yes.

**Note:** (Canada only) The 127mm (5 inch) Monochrome Display is listed in the "Accessories" section. <)

**346mm (14 inch) Color Display (#3352):** Provides a color display with program controlled character size. The screen format may be either 480 characters (12 lines of 40 characters), or 2,000 characters (25 lines of 80 characters). Prerequisite: Feature Expansion A (#4000), the 346mm (14 inch) Display Cable (#3353) and a power cable (#3357 or #3758). Limitation: The color display cannot be integrated on the 4683 base units or cash drawers. Maximum: Two. Field Installation: Yes. Customer Setup: Yes.

**346mm (14 inch) Display Cable (#3353):** Provides a 4m (13.1 ft) cable for attaching the color display to Feature Expansion A (#4000). Prerequisite: 346mm (14 inch) Color Display. Maximum: Two. Customer Setup: Yes.

**300mm (12 inch) Monochrome Display (#3354):** Provides a monochrome display with programmed control character size. The screen format may be either 480 characters (12 lines of 40 characters) or 1,920 characters (24 lines of 80 characters). Prerequisite: Feature Expansion A (#4000), a Distributed 300mm (12 inch) Display Cable (#3355) and a power cable. Limitation: This display cannot be integrated. Maximum: Two. Field Installation: Yes. Customer Setup: Yes.

The 300mm (12 inch) Monochrome Display and the required display line cord part numbers are listed below by country:

300mm (12 inch)		
Monochrome Display P/N	Line Cord P/N	Country
6319014	6952297	Canada
6319016	6952294	Japan, Taiwan
		Philippines
6405255	6952317	Indonesia
6405255	6952353	Singapore
6405274	6952353	Malaysia, Hong Kong
6405255	6952308	Australia, New Zealand

**Distributed 300mm (12 inch) Display Cable (#3355):** Provides a 4m (13.1 ft) cable to connect the display (#3354) to Feature Expansion A (#4000). Prerequisite: 300mm (12 inch) Monochrome Display (#3354). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Pedestal (#3356):** Provides a mounting pedestal that tilts and swivels for the 300mm (12 inch) Monochrome Display. Prerequisite: 300mm (12 inch) Monochrome Display. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Power Cable - 2.8mm (9 ft) (#3357):** Provides a line cord for the 300mm (12 inch) Monochrome Display or 346mm (14 inch) Color Display. Prerequisite: 300mm (12 inch) Monochrome Display or 346mm (14 inch) Color Display. Limitation: Mutually exclusive with Power Cable - 1.8m (6 ft) (#3358). Maximum: Two. Field Installation: Yes. Customer Setup: Yes.

**346mm (14 inch) Color Display Pedestal (#3359):** Provides an optional mounting pedestal that tilts and swivels for the 346mm (14 inch) Color Display (#3352). Prerequisite: 346mm (14 inch) Color Display (#3352). Maximum: Two. Customer Setup: Yes.

**Cash Drawer with Fixed Till (#3360):** Provides a cash drawer with a removable till that contains fixed coin and bill compartments. The cash drawer has a media slot that accommodates approximately a 20.0mm (0.75 inch) stack of documents. Cash drawer opening is under application program control. A cash drawer lock is provided. See "Specify" section for lock insert ordering instructions. Prerequisites: Integrated cash drawer cable (#3364) or Distributed Cash Drawer Cable (#3365). A lock insert must be selected from the Specify codes (#9200 through #9221). Maximum: Two cash drawers (either #3360 and/or #3361) can be used. Field Installation: Yes. Customer Setup: Yes.

**Cash Drawer with Adjustable Till (#3361):** Provides a cash box with a removable till that contains adjustable coin and bill compartments. The cash drawer has a media slot that accommodates approximately a 20.0mm (0.75 inch) stack of documents. Cash drawer opening is under application program control. A cash drawer lock is provided. See "Specify" section for lock insert ordering instructions. Prerequisites: Integrated Cash Drawer Cable (#3364) or Distributed Cash Drawer Cable (#3365). A lock insert must be selected from the specify codes (#9200 through #9223). Maximum: Two cash drawers (either #3360 and/or #3361) can be used. Field Installation: Yes. Customer Setup: Yes.

**Integrated Cash Drawer Cable (#3364):** Provides a cable for use when the cash drawer and base unit are to be used in an integrated configuration. Prerequisite: Cash Drawer #3360 or #3361. Maximum: One per cash drawer. Limitation: Mutually exclusive with Distributed Cash Drawer Cable (#3365). Field Installation: Yes. Customer Setup: Yes.

**Distributed Cash Drawer Cable (#3365):** Provides a 3.8m (12.5 ft) cable for use when the cash drawer and base unit are to be distributed. Prerequisite: Cash Drawer #3360 or #3361. Maximum: One per cash drawer. Limitation: Mutually exclusive with Integrated Cash Drawer Cable (#3364). Field Installation: Yes. Customer Setup: Yes.

**Non-IBM Special Attachment Cable (#3466):** Provides a 4m (13.1 ft) cable to enable a non-IBM cash drawer, or an external alarm, to be attached to the 4683 Models 1 and 2 base units. Contact the IBM Industry Relations department for the Product Attachment Information document that defines the special attachment interface required for attachment. Maximum: Two. Limitation: Mutually exclusive with the Integrated or Distributed Cash Drawer Cables (#3364) and (#3465). Field Installation: Yes. Customer Setup: Yes.

**Printer (#3380):** Provides a wire matrix, bidirectional printer that prints up to a 38-character print line at two print stations. One station provides customer receipt and/or document insert printing. Only one type of document can be printed at any one time. Printing is under application program control. The journal is the second station. It includes a paper motion sensor to detect an "out-of-paper" condition or a paper jam that prevents feeding. The journal cover includes a lock (see "Specify" section for lock insert ordering instructions). The customer receipt and journal stations will accept 88.9mm (3.5 inch) diameter roll paper, 69.85mm (2.75 inch) wide. In addition to standard character sets, an all-points addressable capability allows program-controlled special graphics and logo printing in the customer receipt or document insert station. The matrix print head is customer replaceable and the printer uses a replaceable cartridge ribbon. (See "Supplies" and "Replacement Parts" sections for replacement matrix print head and ribbon ordering instructions.) The printer can be used in an integrated or distributed configuration depending on the attachment cable selected (#3384 or #3385). Prerequisite: Integrated Printer Cable (#3384) or Distributed Printer Cable (#3385). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Integrated Printer Cable (#3384):** Provides a cable for use when the printer is to be positioned on top of the base unit in an integrated configuration. The printer ribbon and two rolls of paper for the journal and customer receipt stations are shipped with the cable. Prerequisite: Printer (#3380). Maximum: One. Limitation: Mutually exclusive with Distributed Printer Cable (#3385). Field Installation: Yes. Customer Setup: Yes.

**Distributed Printer Cable (#3385):** Provides a 3.8m (12.5 ft) cable for use when the printer and base unit are to be distributed. The printer ribbon and two rolls of paper for the journal and customer receipt stations are shipped with the cable. Prerequisite: Printer (#3380). Maximum: One. Limitations: Mutually exclusive with Integrated Printer Cable (#3384). Field Installation: Yes. Customer Setup: Yes.

**Feature Expansion A (#4000):** Provides an expansion option that permits the direct cable attachment of the 127mm (5 inch) Monochrome Display, the 300mm (12 inch) Monochrome Display or the 346mm (14 inch) Color Display. See "Accessories" section for ordering the 127mm (5 inch) display and associated cables. Limitation: Feature Expansion A (#4000) can coexist with one Feature Expansion B (#4001), Feature Expansion C (#4002) or Feature Expansion D (#4003). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Note:** Feature Expansion A (#4000) options shipped before third quarter 1986 will only support the 127mm (5 inch) Monochrome Display. Feature Expansion A (#4000) options shipped after third quarter 1986 will support either the 127mm (5 inch) Monochrome Display (P/N 6316710) or the 300mm (12 inch) Monochrome Display (#3354).

**Feature Expansion B (#4001):** Provides an expansion option that has two cable receptacles that allow the following attachments:

- Receptacle 1: One of the following can be attached:
  - Non-IBM OCR Hand-Held Reader with the non-IBM OCR Hand Held Reader Cable (#4024)
  - 1520 Hand Held Reader Model A01 with the non-IBM OCR Hand Held Reader Cable (#4024)
  - Non-IBM Scale with the non-IBM Scale Cable (#4026)
- Receptacle 2:
  - Non-IBM Coin Dispenser with the non-IBM Coin Dispenser Cable (#4028)

Maximum: Up to two Feature Expansion B (#4001) can be used. Limitation: One Feature Expansion B option can coexist with one Feature Expansion A (#4000), Feature Expansion C (#4002) or Feature Expansion D (#4003). Field Installation: Yes. Customer Setup: Yes.

**Feature Expansion C (#4002):** Provides an expansion option that has four cable receptacles that allow the following attachments:

- Receptacle 1: One of the following can be attached:
  - Non-IBM OCR Hand-Held Reader with the non-IBM OCR Hand Held Reader Cable (#4024)
  - 1520 Hand Held Reader Model A01 with the non-IBM OCR Hand Held Reader Cable (#4024)
  - Non-IBM Scale with the non-IBM Scale Cable (#4026)
- Receptacle 2:
  - Non-IBM Coin Dispenser with the non-IBM Coin Dispenser Cable (#4028)
- Receptacle 3:
  - Asynchronous Communication device with the Asynchronous Communication Cable RS-232-C (#4020)
- Receptacle 4:
  - Asynchronous communication RS-232-C interface or a 20ma current loop interface with the Asynchronous Communication Cable RS-232-C or 20ma Current Loop (#4022)

Maximum: Up to two Feature Expansion C (#4002) options may be used. Limitation: One Feature Expansion C option can coexist with one Feature Expansion A (#4000), Feature Expansion B (#4001) or Feature Expansion D (#4003). Field Installation: Yes. Customer Setup: Yes.

**Feature Expansion D (#4003):** Provides an expansion option having five cable receptacles that allow the following attachments:

- Receptacle 1: One of the following can be attached:
  - Non-IBM OCR Hand-Held Reader with the non-IBM OCR Hand Held Reader Cable (#4024)
  - 1520 Hand Held Reader Model A01 with the non-IBM OCR Hand Held Reader Cable (#4024)
- Receptacle 2:
  - Non-IBM Coin Dispenser with the non-IBM Coin Dispenser Cable (#4028)
- Receptacle 3:
  - Asynchronous Communication device with the Asynchronous Communication Cable RS-232-C (#4020)
- Receptacle 4:
  - Asynchronous communication RS-232-C interface or a 20ma current loop interface with the Asynchronous Communication Cable RS-232-C or 20ma Current Loop (#4022)
- Receptacle 5:
  - Magnetic Wand Reader (#4016)

Maximum: Up to two Feature Expansion D (#4003) options can be used. Limitation: One Feature Expansion D option can coexist with one Feature Expansion A (#4000), Feature Expansion B (#4001) or Feature Expansion C (#4002). Field Installation: Yes. Customer Setup: Yes.

**Note:** Feature #4003 will be available by September 30, 1986. The 1520 Hand-Held UPC/EAN Scanner Model A02 attaches directly to the 4683 base control unit and does not require a feature expansion option.

**Magnetic Stripe Reader (#4010):** Provides a track 2, 75 bpi Magnetic Stripe Reader. This Magnetic Stripe Reader mounts on the 50-Key Modifiable Keyboard (#3320) or the Alphanumeric Keyboard (#3322). Prerequisite: 50-Key Modifiable Keyboard (#3320). Limitations: Cannot be mounted on the 50-Key Modifiable Keyboard or Alphanumeric Keyboard with the Operator Display (#3340). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Note:** A test card is shipped with each Magnetic Stripe reader. See "Accessories" section for additional test cards or Magnetic Stripe Reader Cleaning Cards.

**Security Base (#4012):** Provides a base plate for fastening the 50-Key Modifiable Keyboard (#3320), Operator Display (#3340), Printer (#3380), and 127mm (5 inch) Monochrome Display. This plate may be mounted on the 4683 base unit, the cash drawer (#3360 or #3361), or on a counter top. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**3687 Checkout Scanner Model 2 Adapter (#4014):** Provides a cable and adapter unit for attaching the IBM 3687 Checkout Scanner Model 2 to the 4683 Model 1 or Model 2. The 4.6m (15.0 ft) cable connects to the 4683 Model 1 or Model 2 base unit and to the adapter unit. The adapter unit plugs into the 3687 Checkout Scanner Model 2 and fits in the recessed area in the front of the 3687 Scanner. The 3687 Checkout Scanner Model 2 can coexist with the IBM 1520 Model A02 Hand-Held Scanner on a 4683 Model 1 or Model 2. Prerequisite: 3687 Checkout Scanner Model 2. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Magnetic Wand Reader (#4016):** Provides a hand-held wand to read single-track delta-distance encoded magnetic merchandise tickets and other magnetic stripes using this coding technique. The wand includes a 2m (6.6 ft) flexible cable. Prerequisite: Feature Expansion D (#4003). Maximum: One per 4683 Model 1 or 2. Field Installation: Yes. Customer Setup: Yes.

**Note:** The encoding specifications for Feature #4016 will be furnished by IBM on request.

**Asynchronous Communication Cable RS-232-C (#4020):** Provides a 4m (13 ft) cable that plugs into an 8-pin receptacle on Feature Expansion C (#4002) or Feature Expansion D (#4003) and terminates at a 25-pin "D" type connector. Equipment meeting the EIA RS-232-C interface specification may be attached at distances up to 76m (250 ft) using a customer-provided extension cable that is compatible with the 25 pin "D" type connector. The ASYNC protocols are under application program control. Prerequisite: Feature Expansion C (#4002) or Feature Expansion D (#4003). Maximum: One per Feature Expansion C (#4002) or Feature Expansion D (#4003). Field Installation: Yes. Customer Setup: Yes.

**Asynchronous Communication Cable RS-232-C or 20ma Current Loop (#4022):** Provides a 4.0m (13.1 ft) cable that plugs into a 16-pin receptacle on Feature Expansion C (#4002) or Feature Expansion D (#4003) and terminates at a 25-pin "D" type connector. The interface provides for RS-232-C or current loop/20ma attachment. Equipment meeting the EIA RS-232-C interface specification may be attached at distances up to 76m (250 ft) using a customer-provided extension cable that is compatible with the 25-pin "D" type connector. Equipment meeting the current loop interface specifications may be attached at distances up to 76m (250 ft) by using a customer provided extension cable that is compatible with the 25-pin "D" type connector. The ASYNC protocols are under application program control. Prerequisite: Feature Expansion C (#4002) or Feature Expansion D (#4003). Maximum: One per Feature Expansion C (#4002) or Feature Expansion D (#4003). Field Installation: Yes. Customer Setup: Yes.

**Non-IBM OCR Hand-Held Reader Cable (#4024):** Provides a 4.0m (13.1 ft) cable to enable a non-IBM OCR Hand-Held Reader of the 1520 Model A01 Hand-Held Scannerto be attached to Feature Expansion B (#4001), Feature Expansion C (#4002) or Feature Expansion D (#4003). The non-IBM OCR Hand-Held Reader must meet the requirements stated in the "IBM Retail System OCR A/B Wand Reader Product Attachment Information" document which is available from IBM Industry Relations. This attachment cable terminates with a 25-pin "D" type connector. The non-IBM OCR Hand-Held Reader must be compatible with this connector. Prerequisite: Feature Expansion B (#4001), C (#4002) or D (#4003). Maximum: One non-IBM OCR Hand-Held Reader per 4683 Model 1 or 2. Field Installation: Yes. Customer Setup: Yes.

**Non-IBM Scale Cable (#4026):** Provides a 4m (13.1 ft) cable to enable a non-IBM Scale to be attached to Feature Expansion B (#4001) or C (#4002). Contact the IBM Industry Relations department for the Product Attachment Information document that defines the Scale serial interface required for attachment. Prerequisite: Feature Expansion B or C. Maximum: One per Feature Expansion B or C. Field Installation: Yes. Customer Setup: Yes.

**Non-IBM Coin Dispenser Cable (#4028):** Provides a 4m (13.1 ft) cable to enable a non-IBM Coin Dispenser to be attached to Feature Expansion B (#4001) or C (#4002) or D (#4003). Contact the IBM Industry Relations department for the Product Attachment Information document that defines the Coin interface required for attachment. Prerequisite: Feature Expansion B or C or D. Maximum: One per Feature Expansion B or C or D. Field Installation: Yes. Customer Setup: Yes.

**Base Unit Cable 6 Meters (19.7 ft) (#4030):** Provides a 6m (19.7 ft) cable to connect a 4683 Model 2 to a 4683 Model 1 or A01 base unit or to connect a 4683 Model 2 to a 4683 Model 2 Attachment Adapter Kit installed in a system unit of an IBM Personal Computer, IBM Personal XT, IBM Personal Computer AT, or IBM Personal System/2 Model 30. The cable permits a direct attachment of the base control units without interspersed customer wiring. Prerequisite: A 4683 Model 2. Limitation: Mutually exclusive with Base Unit Cable (#4032) or (#4034). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Base Unit Cable 20 Meters (66 ft) (#4032):** Provides a 20m (66 ft) cable to connect a 4683 Model 2 to a 4683 Model 1 or A01 base unit or to connect a 4683 Model 2 to a 4683 Model 2 Attachment Adapter Kit installed in a system unit in an IBM Personal Computer, IBM Personal XT, IBM Personal Computer AT, or IBM Personal System/2 Model 30. The cable permits a direct attachment of the base control units or system unit without interspersed customer wiring. Prerequisite: A 4683 Model 2. Limitation: Mutually exclusive with Base Unit Cable (#4030) or (#4034). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

uisite: A 4683 Model 2. Limitation: Mutually exclusive with Base Unit Cable (#4030) or (#4034). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Base Unit Cable 4 Meters (13.1 ft) (#4034):** Provides two identical 4m (13.1 ft) cables used to interconnect customer wiring between a 4683 Model 1 or A01 and a 4683 Model 2 base unit or to connect a 4683 Model 2 to a 4683 Model 2 Attachment Adapter Kit installed in a system unit of an IBM Personal Computer, IBM Personal XT, IBM Personal Computer AT, or IBM Personal System/2 Model 30. These cables are required: 1) when the distance between the 4683 base control units is greater than 20m (66 ft) but less than 150m (500 ft) and 2) when the base unit of the 4683 Model 2 and the system unit of the IBM Personal Computer, IBM Personal Computer XT, IBM Personal Computer AT, or IBM Personal Product Model 30 is greater than 20m (66 ft) but less than 122m (400 ft). The customer wiring must conform to the IBM Cabling System. See "IBM 4680 Store System: Preparing Your Site" (GA27-3692), for additional information. Prerequisite: A 4683 Model 2. Limitation: Mutually exclusive with Base Unit Cable (#4030) or (#4032). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Machine Elements:** Some of the above Special Features are also available as Machine Elements. Machine Elements are ordered by part number and can be ordered independently of the 4683 base control unit. Machine Elements are not eligible for IBM maintenance agreement service when not used in conjunction with a 4683 base control unit, and are not eligible for discounts except under the Volume Procurement Amendment. Proof of purchase is required for warranty service from IBM or from an IBM Authorized Value Added Dealer.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

Accessories are available from IBM Direct for Supplies/Accessories.

**Storage Retention Battery (P/N 4783928):** A nickel cadmium battery that will provide power to retain data and programs in main storage during a power interruption. A battery is shipped with each 4683 Model 1 base unit. For replacement batteries order P/N 4783928 (or equivalent).

**Tills and Till Cover with Lock:** Additional cash tills and till covers with locks may be ordered.

	P/N
Cash Till with Fixed Bill Dividers (without Cover)	4783879
Cash Till with Adjustable Bill Dividers (without Cover)	4783880
Cash Till Cover with Lock and Keys	6316718

**Matrix Print Head (P/N 4483100):** A matrix print head is shipped with each printer. For replacement print heads, order P/N 4483100.

**Locks:** The cash drawer, printer journal cover, and keyboard are shipped with lock mechanisms and lock inserts as specified on the initial order. For replacement lock inserts and keys, order the following part number that corresponds to the IBM lock serial number stamped on the face of the installed lock insert. (Replacement keys will not be provided separately from the lock insert which includes two keys.)

	Lock Serial No.	P/N
Random Lock	MM750 thru MM925	4783901
Specific Lock	MM926	4783902

Specific Lock	MM927	4783903
Specific Lock	MM928	4783904
Specific Lock	MM929	4783905
Specific Lock	MM930	4783906
Specific Lock	MM931	4783907
Specific Lock	MM932	4783908
Specific Lock	MM933	4783909
Specific Lock	MM934	4783910
Specific Lock	MM935	4783911
Specific Lock	MM936	4783912
Specific Lock	MM937	4783913
Specific Lock	MM938	4783914
Specific Lock	MM939	4783915
Specific Lock	MM940	4783916
Specific Lock	MM941	4783917
Specific Lock	MM942	4783918
Specific Lock	MM943	4783919
Specific Lock	MM944	4783920
Specific Lock	MM945	4783921
Blank Insert	Blank	4783923

**Keybutton Legend Sheets-Preprinted:** Provides a set of preprinted legend sheets in six colors for the 50-Key Modifiable Keyboard. Order by part number.

Canadian English	6316691
Canadian French	6316702
Spanish	6316700
French	6316693
German	6316692
Italian	6316699
Norway	6316698
Spanish	6317000
Swedish	6316697

**Keybutton Legend Sheets:** Blank key button legend sheets may be ordered for customers who require unique legends. Legend sheets are available in six colors. Each legend sheet has 133 single legends and 15 double legends. Order the following part number for the color required.

Item	Color	P/N	Pkg. Qty.
Legends	White	63X5179	25
Legends	Yellow	63X5180	25
Legends	Red	63X5181	25
Legends	Blue	63X5182	25
Legends	Green	63X5183	25
Legends	Tan	63X5184	25

**Keybutton and Lens:** Keybuttons, lens, shields and a keybutton removal device are shipped with the keyboard. Additional requirements or replacement parts may be ordered. Each item is prepackaged with multiple pieces per package as listed below.

Description	P/N	Pkg. Qty.
Standard height single lens	63X5169	50
Standard height double lens	63X5170	25
Raised single lens	63X5171	25
Raised double lens	63X5172	25
Raised single keybutton	63X5173	25
Key shield	63X5174	10
Keybutton removal device	63X5175	3

**Magnetic Stripe Reader Test Card:** A test card is shipped with each Magnetic Stripe Reader (#4010). For additional or replacement cards order Magnetic Stripe Reader Test Card, P/N 4055210.

**Magnetic Stripe Reader Cleaning Card:** Cleaning cards are not shipped with the Magnetic Stripe Reader (#4010) but may be ordered. Order Magnetic Stripe Reader Cleaning Card, P/N 6019483.

**Loop Data Connector Conversion Kit:** P/N 6428954 provides a data connector with a short cable and other connector parts that are required to convert from an existing store loop connector to the IBM Data Connector used on the 4680 system. The loop wiring system that is to be converted must have been installed to the IBM wiring specifications. A prerequisite is the IBM cabling system junction box, or equivalent (See "IBM Cabling System Catalog", G570-2040).

**Note:** In addition to the Special Features, the 127mm (5 inch) Monochrome Display may be ordered for use on the 4683 Model 1 or 2 when the 4683 is equipped with Feature Expansion A (#4000). The display unit and distributed cable are not covered under the IBM Maintenance offerings.

**127mm (5 inch) Monochrome Display (P/N 6316710):** Provides a monochrome display with program controlled character size. The screen format may be either 120 characters (6 lines of 20 characters) or 480 characters (12 lines of 40 characters). The display includes a cable and can be positioned on top of the 4683 base unit in an integrated configuration. A distributed cable (P/N 6316852) must be ordered when the display is to be used in a distributed configuration. Prerequisite: Feature Expansion A (#4000). Limitation: Cannot be used with a 40-Character Alphanumeric Display (#3343) or a 300mm (12 inch) Monochrome Display (#3354). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Distributed 127mm (5 inch) Display Cable (P/N 6316852):** Provides a 4.0m (13.1 ft) cable for use when the display (P/N 6316710) and the 4683 base unit are to be distributed. Prerequisite: 127mm (5 inch) Monochrome Display. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

## MACHINE ELEMENTS

Machine Elements may be ordered by IBM Direct Order.

Description	P/N
50-Key Modifiable Keyboard	4783896
Alphanumeric Keyboard	
Canadian English	76X0035
Canadian French	76X0036
English UK	76X0043
Spanish	76X0044
Shopper Display	63X5000
Operator Display	63X5026
40-Character Alphanumeric Display	4783888
Cash Drawer with Fixed Till	4783794
Cash Drawer w/ Adjustable Till	4783795
Printer	4483110
Feature Expansion A	4783791
Feature Expansion B	4783790
Feature Expansion C	4783792
Feature Expansion D	4783770
Magnetic Stripe Reader	4783944
Magnetic Wand Reader	4783763
Display Extension Cable	63X5030
Integrated Keyboard Cable	6316858
Distributed Keyboard Cable	6316857
Key Button Kit - Retail Format	6428694
Integrated Alphanumeric Display Cable	6316834
Distributed Alphanumeric Display Cable	6316864
Integrated Cash Drawer Cable	6316831
Distributed Cash Drawer Cable	6316832
Integrated Printer Cable	6428966
Distributed Printer Cable	6428961

## MACHINES

Security Base	4783797
3687 Checkout Scanner Adapter	6428942
Model 2	
Asynchronous Communication Cable-	6316846
RS-232-C	
Asynchronous Communication Cable-	6316845
RS-232-C or Current Loop	
Non-IBM OCR Hand-Held Reader	6316850
Cable	
Base Unit Cable	6316837
6 meters	6316838
20 meters	4783789
4 meters-includes two cables)	
(Canada only>	
Base Unit Power Cables:	
4.3m (14 ft) Non-Locking	6952296
4.3m (14 ft) Locking	7842130
<)	
Non-IBM Special Attachment	63X4997
Cable	76X0003
Non-IBM Scale Cable	6316847
Non-IBM Coin Dispenser Cable	
300mm (12 inch) Monochrome Display	6319014
Canada	

Japan, Taiwan, Philippines	6319016
Indonesia, Singapore,	
Australia, New Zealand	6405255
Malaysia, Hong Kong	6405274
Distributed 300mm (12 inch)	
Display Cable	6428911
Display Pedestal	6319013
Display Power Cable 2.8m (9 ft)	6952297
Display Power Cable 1.8m (6 ft)	6952298
346mm (14 inch) Color Display	6405301
346mm (14 inch) Display Cable	6316823
346mm (14 inch) Display Pedest	6165550

## SUPPLIES

**Ribbons:** A black ribbon cartridge (P/N 4483015 or equivalent), is required.

**Paper:** Printer roll paper (P/N 432767 or equivalent) 88.9mm (3.5-in.) diameter, 69.85mm (2.75-in.) wide is required at the customer receipt and journal print station. P/N 432767 provides a case of 50 rolls.

Contact your country DP supplies Coordinator.

## 4701 FINANCIAL COMMUNICATION CONTROLLER MODELS 1, 2, 3

**THERE IS MORE THAN 1 TEXT VERSION FOR THIS PRODUCT**

### PURPOSE

A programmable controller for attachment of 4700 Finance Communication System terminals and 3600 Finance Communication System terminals to S/370, 303X, 308X, 3090 or 4300 Processors, S/34, S/36, S/38 or 8100 System.

### MODELS 1, 2, 3

**Model 1 001:** A programmable controller with a base configuration of 192K bytes of machine storage, two loops, SDLC communication adapter, and one diskette drive which accommodates 1- or 2-sided removable diskettes (type 1 or 2) to provide up to 0.5 megabytes of diskette storage. May be upgraded to provide a maximum of four loops, 512K bytes of machine storage and one auxiliary diskette storage feature (0.5 or 1.0 megabyte).

**Model 2 002:** A programmable controller with a base configuration of 256K bytes of machine storage, two loops, SDLC communication adapter, and one diskette drive which accommodates 1- or 2-sided removable diskettes (type 1, 2, or 2D) to provide up to 1.0 megabyte of diskette storage. May be upgraded to provide a maximum of four loops, 896K bytes of machine storage and one auxiliary diskette storage feature (1.0 megabyte only). May also be upgraded to provide a maximum capacity of 60Mb of Disk Storage.

**Model 3 X03:** A programmable controller with a base configuration of 512K bytes of machine storage, two B-loops, SDLC communication adapter, and one diskette drive which accommodates a 2-sided removable diskette to provide up to 1.0 megabyte of diskette storage, encryption and hardware error correction capability. May be upgraded to provide a maximum of four B-loops and 16 Cluster Adapter Ports. May also be upgraded to provide a maximum capacity of 60Mb of Disk Storage. Alternatively, one or two IBM 4708 Disk Units may be attached for a maximum disk storage capacity of 176Mb. There are five models based on machine storage size as follows: Model A03=512K bytes, B03=768K bytes, C03=1.0M bytes, D03=1.28M bytes, E03=1.54M bytes.

**Customer Setup (CSU):** The 4701 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, refer to the GI section. One copy of the CSU Instructions and diagnostic diskette are shipped with each 4701. The CSU allowance is four days. Machine and selected specify features.

### HIGHLIGHTS

**Machine Storage:** For the Model 1 controller the base 192K bytes of machine storage and the additional storage increments, when present, are contiguous and are available to provide the storage as required for system control, selected device, feature, or function support and user-programmable storage.

For the Model 2 controller, the base 256K bytes of machine storage and storage increments up to 512K bytes, when present, are contiguous. When total storage capacity exceeds 512K bytes, storage is divided into a user/microcode storage area and a microcode storage area, and addressing is no longer contiguous. The minimum microcode storage area is 256K bytes. Refer to the "IBM 4700 System Configurator" (GC31-2017) for a comprehensive list of storage requirements and details on determining the amount of additional storage, if any, required.

For the Model 3 controller, the base 512K bytes of machine storage and storage increments up to 1.54K, when present are contiguous.

Controls all the functions of 4700 Finance Communication System and/or 3600 Finance Communication System terminals. The 4700 Online Terminal Support for System/34 PRPQ (5799-BGB) supports the 4704 Model 1, 5210 Models G01, G02 Printers, 4710, 3603, 3610, 3611, 3616 and 3624 (multi-line display only).

Controls data transmission between terminals and the central processing site. Host data transmission via SDLC can be at speeds up to 9600 bps (38.4K bps via 8100 Loop), or via BSC at speeds up to 4800 bps dependent on the other elements of the host connection facility. Communication Link Limit information will be found in the "IBM 4700 System Configuration" (GC31-2017). The base controller also offers integrated encryption to provide security of personal identification numbers (PINs), messages and software.

All 4700 system terminals (except 4704-2 and 4704-3) and 4730 are attached by loops which may be selected to operate at speeds of 1200, 2400 or 4800 bps.

The Model 1 controller contains 192K bytes of machine storage for use as system control: device, feature, function support and user-programmable storage. One additional 64K byte storage increment and two 128K byte storage increments are available for a total of 512K bytes. For a 192K, 320K or 448K byte Model 1 controller already installed, a maximum of one additional 64K byte storage increment and, respectively, two 128K, one 128K or zero 128K byte storage increments are allowed. The Model 2 controller contains 256K bytes of machine storage. A maximum of five additional 128K byte storage increments are available for a total of 896K bytes. For a 192K, 320K or 448K byte Model 2 controller already installed, a maximum of one additional 64K byte storage increment and, respectively, five 128K, four 128K, or three 128K byte storage increments are allowed. The base Model 3 controller contains 512K bytes of machine storage. Four additional models in increments of 256K bytes up to 1.54M bytes are also available. Refer to the "IBM 4700 System Configurator" (GC31-2017) for detailed storage use information.

Two loops are provided. An optional feature providing two loops (for a total of four) is available. Houses a direct access diskette drive for 1- or 2-sided removable diskettes which provide up to 0.5 megabytes (Model 1) or 1 megabyte (Model 2 or Model 3) of diskette storage for controller data and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). One additional diskette drive may be attached. A maximum capacity of 60Mb of disk storage may be attached for temporary and permanent storage of user data (Model 2 or Model 3). Alternatively, for the Model 3 only, one or two 4708 Disk Unit(s) Model 5 may be attached for a maximum disk storage capacity of 176Mb.

The 4701 192K byte Model 2 controller has been designated as a Model A2 controllers for administrative purposes only. Additional storage increments to the Model A2 requires a model conversion via a MES. The model conversion includes 64K bytes of additional machine storage.

An optional Cluster Adapter feature is available to provide local high speed attachment. (See Cluster Adapter (#3101) description for devices supported.)

### System Attachment:

**Note:** See Program Product pages for host support programming information.

- S/370, 303X, 308X, 3090 or 4300 Processors: Remote attachment using SDLC or BSC-3 via a 3704, 3705 or 3725 Communications Controller. BSC-3 requires optional BSC Communications feature (#1422).
- 4341, 4361, 4381, 303X, 308X or 3090 processors: Remote attachment using SDLC or BSC-3 via a 3720 Communication Controller.
- 4331 Processors: Remote attachment using SDLC or BSC-3 via the Communication Adapter on the 4331 BSC-3 requires

optional BSC Communications (#1422). Local attachment using SDLC or BSC-3 via 4331 Local Attachment feature. BSC-3 requires optional BSC Communications (#1422).

- 8100 Units (8101, 8130, 8140): Remote attachment or Direct connection using SDLC via 8100 unit Data Link features.
- Loop attachment using SDLC via 8100 data link loop; requires optional Loop Adapter (#4850). Remote loop attachment using SDLC via a 3843 Loop Control Unit; requires optional Loop Adapter (#4850).

The following attachments are supported by the DPPX/DSC capability:

- S/34 or S/36 Processors: Remote attachment or local attachment using SDLC via S/34 or S/36 Communication Adapter feature.
- S/38 Processors: Remote attachment using SNA/SDLC via S/38 Communication Attachment (#1501).

Note: Refer to the PRPQ list for applicable PRPQs.

Each 4701 operates in half-duplex mode. When operating in an SNA environment, duplex communication line operations are possible (except S/34 or S/36) with multiple 4701s attached to the line, one 4701 transmitting, while another receives. The 4701 contains a communication adapter without business machine clocking and CCITT V.24/V.28 interface for direct connections or for attaching external modems operating via SDLC at speeds up to 9600 bps or BSC-3 with optional BSC Communications feature at speeds up to 4800 bps. The Data Circuit-terminating Equipment (DCE) must provide its own clocking. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

**Note:** SNA and BSC Communications are mutually exclusive. Conversion in the field from one to the other requires an RPQ.

When using SDLC, the X.21 adapter for nonswitched or switched networks (#1424) is available in place of the standard EIA/CCITT interface.

The 4701 can be programmed to operate independently when the host processor is unavailable. It is also capable of controlling all terminal functions, executing arithmetic and capturing data from the terminals for later transmission to the host processor.

When used either with a non-S/370 compatible host system or without a host system, the Local Configuration Facility (LCF) specify #9490 may be ordered, see "Controller Data Support".

**Transmission:** The 4701 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

**Modems:** External modems operating at speeds up to 9600 bps for SDLC links, or 4800 bps for BSC-3 links, may be used.

Modem	Speed (bps)	Facility
3833-1	2400	Nonswitched
3834-1	4800	Nonswitched
3863	2400	Switched or non-switched (voice grade lines)
3864	4800	Switched or non-switched (voice grade lines)
3865	9600	Nonswitched (voice grade lines)
3868-1	2400	Nonswitched (voice grade lines)
3868-2	4800	Nonswitched (voice grade lines)
3868-3,4	9600	Nonswitched (voice grade lines)
3872	2400	Switched or non-

3874	4800	switched (voice grade lines)
5811-10	2400	Switched or non-switched (voice grade lines)
	4800	Nonswitched baseband
	9600	Nonswitched baseband
5811-18		Nonswitched baseband
5811-20	2400	Rack mount version of 5811-10
	4800	Nonswitched baseband
	7200	Nonswitched baseband
	9600	Nonswitched baseband
5811-28		Nonswitched baseband
5812-10	2400	Rack mount version of 5811-20
	4800	Nonswitched baseband
	7200	Nonswitched baseband
	9600	Nonswitched baseband
5812-18		Nonswitched baseband
5821-10	2400	Rack mount version of 5812-10
	4800	Nonswitched baseband
	9600	Nonswitched baseband
5865-001, 002, 003	9600	Nonswitched
5866-001, 002, 003	9600	Nonswitched
5866-001, 002, 003	14000	Nonswitched
5868-051,52		Rack mount version of 5868-001,002
5868-061,62		Rack mount version of 5866-001,002
5979-L41	9600	Limited distance COAM line

**Customer Responsibilities:** All customers must be advised that their responsibilities include:

1. Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
2. Adequate site, system and other vendor preparation.
3. Price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
4. Receipt at the customer's receiving dock, unpacking and placement of the 4701.
5. Performing 4701 checkout in accordance with supplied procedures for initial installation or relocation, and updating of controller diskettes (at customer option).
6. Physical setup, connection of cables in protected customer access areas including loop cables, cable to host communi-

cation lines/modems, and cables for Disk Storage features and Auxiliary Diskette feature.

7. Installation of the controller data support and generation of the operational diskettes, at initial controller installation and for any subsequent release distribution.
8. Checking communications to the host processor.
9. Security for erasure of data from a failing Disk Storage feature being returned to IBM. It is IBM's practice to erase any remaining data on a returned disk before reusing it.
10. Using the problem determination procedures provided with the 4701 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to (Canada only > forwarding the failing unit to an IBM-designated location or <) requesting On-Site Service (see "Maintenance" below).
11. Determining the need for any required spares.
12. Notifying IBM of intent to relocate the 4701 and following IBM instructions regarding relocation.

**Maintenance:** Maintenance of 4701s is available under IBM Maintenance agreement for On-Site Service. It is the customer's responsibility to setup the equipment and to determine when maintenance is required.

On-Site Service is provided during the warranty period.

Customers with 4701s not covered by IBM Maintenance Agreements may pay a time-and-material charge to have the unit(s) repaired (if the unit is repairable).

If maintenance coverage is not contracted immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement Coverage, he must first have the machine(s) inspected so that eligibility for maintenance coverage may be determined.

If, on the basis of the inspection, it is concluded that the state of the machine precludes normal maintenance, the machine is returned to the customer without charge.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

**Bibliography:** For information on 4701 publications, refer to the "4700 System Summary" (GC31-2016).

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Power (AC, 1-phase): Specify #2998, then select one of the following:
  - #9892 - 60 Hz/100-120V
  - #9893 - 50 Hz/100-110V
  - #9894 - 50 Hz/200-240V
- Plugs:
  - (Canada only > Specify #9890 for locking plug. If not specified, a nonlocking plug will be provided (for 60 Hz, 120V, 1-phase). <)
  - (Japan only > Specify #9890 for locking plug. If not specified a nonlocking plug will be provided (for voltages under 200V). <)
  - (Except Canada and Japan > The 3-digit WT Country Code of the DP Machine Order Sheet is used to select a power plug which matches the most commonly-used power supply in each

country. If an exception to the above is required, a Country RPQ may be initiated. <)

**Note:** If an AC power source, other than the most common in the Country, is specified and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the Country RPQ referenced above is initiated.

A line cord of 3.0m (9.8 ft) and the country-approved plug will be provided at the time of shipment.

### ● Nomenclature:

Canadian French      Japanese #2930  
Bilingual #2934      Spanish #2931  
English #2927

- Controller Storage Size: Controller storage size for Models 1 and 2 must be specified on all orders and MESSs.

Select one of the following for Model 1 or 2:

#9616 256K for Model 1 or 2  
#9617 384K for Model 1 or 2  
#9618 512K for Model 1 or 2  
#9619 640K (384K user/256K microcode) for Model 2  
#9620 768K (384K user/384K microcode) for Model 2  
#9621 768K (512K user/256K microcode) for Model 2  
#9622 896K (512K user/384K microcode) for Model 2

No specify code is required for ordering a base 192K byte Model 1 controller. Controllers with greater than 192K bytes of machine storage have one specify code #9612 (320K bytes), #9614 (448K bytes) or #9616 (256K bytes), #9617 (384K bytes), and #9618 (512K bytes) to identify the current storage configuration.

When a storage increment is ordered via MES or via a Model A2 to Model 2 conversion, the old specify code must be deleted and the proper new specify code must be added.

- Fan-Out Communication Adapter Line Speed: For #1551, specify as follows:

Specify	Speed	Maximum Cable Length
#9181	9600 bps	30.48m (100 ft)
#9182	4800 bps	60.96m (200 ft)
#9183	2400 bps	121.92m (400 ft)

- Loop Adapter Line Speed: For #4850, specify as follows:

#9625 9,600 bps  
#9629 38,400 bps

- X.21 Adapter: #9750 for switched network or #9751 for non-switched network.
- Controller Data Support: The selected controller data support is supplied when the controller is shipped. It is the customer's responsibility to install it and any subsequent levels of the data support supplied. Encryption capability via the DEA algorithm is included in the data support. This encryption capability is not available in Surinam or Hungary.
- Ordering Information for 4700 Controller Data: There are three specify codes (#9490, #9491 and #9492) for ordering controller data for the 4700 controllers. These specify codes enable the user to order each controller with the capability of creating operational diskettes either at a S/370 or S/370-compatible host system and/or at the controller site. When ordering a controller for which it is intended that operational diskettes will be generated at the controller site, use specify code #9490. When ordering the initial controller for a user who intends to generate operational diskettes using a S/370 or S/370 compatible host system, use specify #9491, and when ordering additional controllers use specify code #9492.

Distribution of controller data media, specify one of the following:

- #9490 identifies a controller which requires the capability to create operational diskettes at the controller using the Local Configuration Facility (LCF). Three controller data diskettes will be shipped with the controller.

1. Installation Diskette
2. LCF Pre-Operational Diskette
3. LCF Program Diskette

LCF requires a 4704 Display Terminal with the Alpha-meric Keyboard (#4662) for the necessary dialog between the user and the controller. An Auxiliary Diskette Drive (#1035 or #1045) is also required on at least one 4701 per enterprise to do diskette copy for backup or distribution of LCF Operational diskettes to other branch 4701 controllers.

**Note:** #9490 should be used to provide Controller Data Media for only those controllers which require a system generation facility at the controller. Unnecessary shipment of multiple diskettes will result if specified when not required.

- #9491 identifies the initial controller used with a S/370 or S/370-compatible host system location. The user will receive a DTR tape delivered to the address described below and an Installation diskette included with the controller.

**Note:** Do not specify #9491 for more than one controller per host system as this will result in the unnecessary shipment of multiple DTR tapes.

If #9491 is specified, select the specify code of the desired media:

- #9413 - 9/1600 Magnetic Tape (CSU)
- #9414 - 9/6250 Magnetic Tape (CSU)

#9492 used to order additional controllers when neither a DTR nor a pre-operational diskette is required, or when operational diskette creation is not required.

Any time #9490 or #9491 is specified, enter supplementary specifications (via AAS order entry) exactly as follows to indicate shipping address of the Host System Location. Specify #9490 or #9491 must be specified as first controller and the supplemental address completed. Do not specify #9492 for all controllers for a single customer.

- Line 1 - C/O (Name of customer)
- Line 2 - Street Address (or P.O. Box)
- Line 3 - City, Country, Postal Code.

This is the address to which the initial controller data tape will be automatically shipped.

- Cables: See "Accessories" for additional information. See also "4700 Finance Communication System, Installation Planning Manual" (GC31-2018).

(Japan only) Specify #3711 for metric screws when ordering cable connector (default will supply SAE-inch screws). <)

## SPECIAL FEATURES

Unless otherwise stated, all features available for field installation require service personnel.

## NON-COMMUNICATIONS FEATURES

For specify codes #9618 and #9622, the last 8,192 bytes of machine storage are not addressable by the user.

**Add'l Storage (#1008):** Provides an additional 64K (65,536) bytes of machine storage. Limitations: Can only be ordered as an additional increment on already installed Model 1 192K, 320K, or 448K byte machines and Model 2 320K or 448K byte machine via MES. Maxi-

mum: One, see "Limitations". Field Installation: Yes, field only. Specify: See table below.

**Add'l Storage (#1009):** Provides an additional 128K (131,072) bytes of machine storage. Limitations: Model 1 is restricted to specify codes #9617 and #9618. Maximum: The maximum number of #1009 for Model 1 is two. The maximum number of #1009 for the Model 2 is five. Field Installation: Yes. For specify codes #9619, #9620, #9621 and #9622, parts removed becomes the property of IBM. Specify: See table below and controller storage size in the "Specify" section. Note: This additional storage is no longer required.

Feature and specify codes required for storage upgrades (Model 1 and 2):

ADD'L STORAGE TABLE (K bytes)

*-----*				
From	To Storage Size			
Stg	Specify Code			
Size	#9616	#9617	#9618	#9619
192	#1008	#1008	#1008,	X
		#1009	2 #1009	
256	X	#1009	2 #1009	3 #1009
320	X	#1008	#1008,	#1008,
			#1009	2 #1009
384	X	X	#1009	2 #1009
448	X	X	#1008	#1008,
				#1009
512	X	X	X	#1009
640	X	X	X	X
768	X	X	X	X
*-----*				

*-----*				
From	To Storage Size			
Stg	Specify Code			
Size	#9620	#9621	#9622	
192	X	X	X	
256	4 #1009	4 #1009	5 #1009	
320	#1008,	#1008,	#1008,	
	3 #1009	3 #1009	4 #1009	
384	3 #1009	3 #1009	4 #1009	
448	#1008,	#1008,	#1008,	
	2 #1009	2 #1009	3 #1009	
512	2 #1009	2 #1009	3 #1009	
640	#1009	#1009	2 #1009	
768	X	X	#1009	
*-----*				

For a 192K byte Model 2 upgrade, see "Model Conversions".

Notes:

- Specify #9619 = 384K user storage and 256K microcode storage.
- Specify #9620 = 384K user storage and 384K microcode storage.

- Specify #9621 = 512K user storage and 256K microcode storage.
- The minimum microcode storage is 256K bytes.
- Specify #9619 to #9622 are for Model 2 only.

Customer Order Acknowledgement Letters for purchase MESs for specify codes #9619, #9620, #9621, and #9622 will involve the removal of parts which become the property of IBM.

**Auxiliary Diskette Storage 0.5 Megabyte (#1035):** (Model 1) Provides approximately 560,000 bytes of additional diskette storage via a second diskette drive for 1- or 2-sided diskettes. No storage area offered by the auxiliary (or secondary) diskette will be reserved for the control program. Limitations: May not be installed with #1045. Maximum: One. Field Installation: Yes. Prerequisites: #3651.

**Auxiliary Diskette Storage 1.0 Megabyte (#1045):** Provides approximately 985,088 bytes of additional diskette storage via a second diskette drive for 1- or 2-sided diskettes (type 1, 2 or 2D). No storage area offered by the auxiliary (or second) diskette will be reserved for the control program. Limitations: May not be installed with #1035. Maximum: One. Field Installation: Yes. Prerequisites: #3651, or #3652 and #1065, or #3652 and #1055.

**Disk Storage 15.4 Megabyte (#1055):** Provides 15,423,488 bytes of disk storage when ordered with Expansion Frame (#3652). Limitations: Can only be installed with #3652, or #3652 and #1045. Cannot be installed with #1065 or #1075. Maximum: One. Field Installation: Only when ordered for delivery with expansion frame #3652. Prerequisites: #3652.

**Disk Storage 30.8 Megabyte (#1065):** Provides 30,846,976 bytes of disk storage when ordered with Expansion Frame (#3652). Limitations: Can only be installed with #3652, or #3652 and #1045, or #3652 and #1075. Cannot be installed with #1055. Maximum: One. Field Installation: Only when ordered for delivery with Expansion Frame #3652. Prerequisites: #3652.

**Second Disk Storage 30.8 Megabyte (#1075):** Provides an additional increment of 30,846,976 bytes of Disk Storage. Limitations: Can only be installed with #3652 and #1065. Cannot be installed with #1045 or #1055. Maximum: One. Field Installation: Yes. Prerequisites: #3652 and #1065.

**Cluster Adapter (#3101):** Provides for the local attachment of up to a maximum of eight devices with a mix of 3262 Model 3, 13 Line Printers, 4214 Model 1 Printer, 4245 Model D12, D20 Line Printers, 3178 Models C1, C2, C3, 3179 Model 1, 3180 Model 1, 3278 Model 2(Japan only), 52(<) Display Stations, 3279 Model 2A, S2A, 2B, S2B, 02X, 4704 Model 2 Display Stations, 4704 Model 3 Display Stations, (Japan only) 3283 Model 52,(<) (Canada only) and 5150 or 5160 XT Personal Computer or Personal Computer AT (5170),(<) 5210 Models G01, G02 Printwheel Printers, and 3287 Model 1, 2 Printers, 6580 Displaywriter System operating like a 3262. When attaching the 3180 Model 1 Display Station, only the 1,920 and 3,564 character screen sizes are supported. The 4701 does not support all 3180 functions. When attaching the 3278 Model 2 Display Station to the device cluster adapter, no-charge 3278 RPQ 8K0880 is required. (Japan only) When attaching the 3278 Display Station Model 52 to the Device Cluster Adapter, no-charge 3278 RPQ 7F0148 is required.(<) When attaching Displaywriter via the 3278 emulation adapter, file transfer is not supported on the 4701. When attaching the Personal Computer and Personal Computer XT, file transfer is supported on the 4701 only with the 3278/79 Emulation Adapter (#2507) and the Applications Services Program Product (6934406). See M6580(Canada only), 5150 or 5160(<) pages for additional prerequisites and/or limitations. Limitations: Maximum distance from controller to terminal is 1,500m (4,920 ft). The 5210 printer is supported in SCS mode only. Maximum: One. RPQ required for second set of Cluster Adapters. Field Installation: Yes.

**Diskette Expansion Unit (#3651):** Provides a matching unit for housing an auxiliary diskette drive. The unit is cable-attached to the main unit. Limitations: Cannot be installed with #3704, #3705 or #3652. If #1035 is installed, conversion to #1045 is via RPQ 8V0099. Maximum: One. Field Installation: Yes. Prerequisites: #1035 or #1045.

**Disk Expansion Unit (#3652):** Provides a matching unit for housing up to 60Mb of disk storage capacity. No storage area offered by the Disk Storage features will be reserved for the control program. Limitations: Cannot be configured with #3704, #3705 or #3651. Can only attach to 4701 Model 2 and Model 3. Maximum: One. Two with RPQ 8V0223. Field Installation: Yes. Prerequisites: #1055, or #1045 and #1055, or #1065, or #1065 and #1075, or #1045 and #1065.

**Disk Unit Redrive Adapter (#3704):** Provides the attachment capability for one IBM 4708 Disk Unit Model 5. Limitations: May only be installed in a 4701 Model 3. May not be installed with #3705, #3651 or #3652. Maximum: One. Field Installation: Yes. The 4708 Disk Unit must be present at time of installation.

**Disk Unit Redrive Adapter (#3705):** Provides the attachment capability for two IBM 4708 Disk Units Model 5. Limitations: May only be installed in a 4701 Model 3. May not be installed with #3704, #3651 or #3652. Maximum: One. Prerequisite: Specify #9652 must be ordered on each second 4708 Disk Unit. Field Installation: Yes. The 4708 Disk Units must be present at time of installation.

**Note:** To accommodate 4708 attachment to 4701-003, switched must be set in the 4701-003 by Field Engineering.

**Add'l Loops (#4745):** Provides two additional loops for attachment of additional 4700 Finance Communications System or 3600 Finance Communications System terminals. Maximum: One feature providing two loops. Field Installation: Yes.

## COMMUNICATIONS FEATURES

**BSC Communications Without Business Machine Clocking (#1422):** Required for attachment to communications lines through an external modem which does have internal clocking at speeds up to 4800 bps when operating with Binary Synchronous Communications BSC-3. Limitations: Cannot be installed with #4850, #1424. Maximum: One. Field Installation: Not recommended. Note: SNA and BSC communications are mutually exclusive. Conversion in the field from one to the other requires an RPQ.

**X.21 Adapter for Nonswitched or Switched Networks (#1424):** This feature provides an interface and 6m cable for attachment to an X.21 native nonswitched network with no changes to existing SNA/SDLC procedures for controlling nonswitched lines. This feature will operate only with SNA/SDLC procedures. It enables the user to connect DCEs whose electrical characteristics match those described in CCITT Recommendation X.21 for nonswitched point-to-point and multi-point communication. The network establishes the data rate and supplies the clock. Speeds supported include 2400, 4800 and 9600 bps. Also provides an interface adapter and six meter cable for attachment to the X.21 Switched Network. SDLC Communications at speeds of 2400, 4800 and 9600 bps are supported. Limitations: Cannot be installed with #1422 or #4850. Maximum: One. Field Installation: Not recommended. Specify: #9750 for switched network or #9751 for nonswitched network.

**Fan-Out Communications Adapter (#1551):** Permits local attachment of up to four 4730 Personal Banking Machines or 4736 Personal Banking Machines communicating via SDLC. Limitations: Cannot be installed with #3701. Maximum: One. Field Installation: Yes. Prerequisites: #4502. Specify: One of the following line speeds:

Specify	Speed	Maximum Cable Length
#9181	9600 bps	30.48m (100 ft)
#9182	4800 bps	60.96m (200 ft)
#9183	2400 bps	121.92m (400 ft)

Note: All attached 4730s and 4736s will run at the selected speed.

**EIA/CCITT Interface (#3701):** Provides the appropriate cables and interface logic necessary to attach an external modem for communications attachment to remote 4730 Personal Banking Machines and 4736 Personal Banking Machines via a SDLC at speed up to 9600 bps. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy. Limitations: Cannot be installed with

#1551. Maximum: One. Field Installation: Yes. Prerequisites: #4502.

**SDLC Communications Adapter Without Business Machine Clocking (#4502):** Required to communicate with local or remote 4730 Personal Banking Machines and 4736 Personal Banking Machines using SDLC at speeds from 1200 bps to 9600 bps. Limitations: Can only be used to attach the 4730 Personal Banking Machine. Maximum: One. Field Installation: Yes.

**Loop Adapter (#4850):** This feature provides the ability for the 4701 controller to attach to a direct or data link loop of the 8100 System. Direct Loop attachment supports up to 38.4K bps. Data link loop attachment supports 4800 and 9600 bps. A direct attached loop can use a 9.6K or 38.4K Hz carrier; a data link attached loop uses a 9.6K Hz carrier. Specify: One of the following must be specified: #9625 for 9.6K Hz carrier or #9629 for 38.4K Hz carrier. All terminals on a loop must use the same carrier frequency. Limitations: Cannot be installed with #1424 or #1422. Maximum: One. Field Installation: Not recommended.

## MODEL CONVERSIONS

Model 1 may be converted to a Model 2 having 256K, 384K or 512K bytes of machine storage.

Model 1s with 192K, 320K or 448K bytes of machine storage will be converted to Model 2s with 256K, 384K, or 512K bytes respectively. When ordering either of these two conversions, order #9998 for administrative purposes only.

In addition to the model conversion, one storage feature #1008 and a no-charge RPK S80005 must be ordered.

Model 1s with 256K, 384K, or 512K bytes of storage will be converted to Model 2s of the same machine storage size. In addition to the model conversion, a no-charge RPK S80005 must be ordered. To upgrade to larger machine storage sizes see the table for the features that must be added to the Model 2 to reach the desired storage size. Parts removed become the property of IBM. Model 2s installed with 192K, bytes of machine storage have been designated as Model A2 for administrative purposes only. Adding storage increments to Model A2 requires conversion from a Model A2 to a Model 2. This conversion includes 64K bytes of machine storage. Parts removed become the property of IBM. If Expansion Frame (#3651) is installed, it must have a Auxiliary Diskette Storage 1.0 Megabyte (#1045) installed. See "Limitations" under Expansion Frame (#3651).

A Model A02 or 002 may be converted to a Model XX3 as specified in the following model conversion table. Also shown are the model conversions allowed between Model XX3s.

Frm	Stg	Spe-	To Mdl	Storage	Size		
Mdl	Size	Code	512K	768K	1.0M	1.28M	1.54M
A02	192K		A43	NO	NO	NO	NO
002	256K	9616	A03	NO	NO	NO	NO
A02	320K	9612	A13	NO	NO	NO	NO
002	384K	9617	A23	NO	NO	NO	NO
002	448K	9614	A33	NO	NO	NO	NO
002	512K	9618	NO	B03	NO	NO	NO
002	640K	9619	NO	B13	NO	NO	NO
002	768K	9620	NO	NO	C03	NO	NO
002	768K	9621	NO	NO	C03	NO	NO
002	896K	9622	NO	NO	C13	NO	NO
AX3	512K		NO	B03	C03	D03	E03
BX3	768K		NO	NO	C03	D03	E03
CX3	1.0M		NO	NO	NO	D03	E03
D03	1.25M		NO	NO	NO	NO	E03

## ACCESSORIES

**Keylock Cable Assembly (P/N 6018769):** Replacement keylock cable assembly (used to load Master key) may be purchased from IBM. Order via MES from plant of manufacture

**Cables:** Shielded twisted-pair cable is available for attaching 4700 terminals to the 4701 controller in a loop configuration. The loop can be implemented using the IBM Cabling System or banking loop cable. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**IBM Cabling System:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation within your country.

**Banking Loop Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "4700 Finance Communication System - Installation Planning Manual", GC31-2018.

The following are "X" length cables with maximum length shown for attachment of 3262, 3287, 3278 to a 4701:

Cable	Assem	No	Use	Length
(Japan only>				
8249922	Cable Assembly-			
	Metric CCITT			6m (20 ft)<)
6018886	Cable Assembly-			4.27m (14 ft)
	Multi-use Loop			
5718197	Cable Assembly-			6m (20 ft)
	X.21			
5718195	Cable Extender-			0.3m (1 ft)
	X.21			
8249921	Cable Assy, (Inch)-			6m (20 ft)
	EIA/CCITT			
1563155	Loop Cable			610m
	Assembly			(2,000 ft)

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories. Maximum distance from controller to terminal is 610m (2,000 ft.) using shielded twisted-pair cable or 1,500 meters (4,920 ft.) using coaxial cable.

**Twisted-pair Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide", GA27-3361. For pricing and ordering information, refer to the System Supplies operation within your country.

**Coaxial cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning", GA27-2787, and "Coaxial Cable and Associated Manual", GA27-2805.

2577672	Cable Assembly	
	- indoor	1,500m
		(4,920 ft)
or		
323921	Coax Wire	1,500m
		(4,920 ft)
and		
1836418	Connector Kit	

Note: Standard length communication cables are automatically shipped with the 4701.

## GENERAL ACCESSORIES

For delivery with the machine (if offered), specify the appropriate feature number on 4700 machine order. For delivery at any other time, specify the appropriate part number on parts and supplies requisition.

**Filters:** Anti-glare filters protect against light reflection and provide either a yellow character display on a brown background (amber) or bright green characters on a dark green background (green). One filter is provided with each 4700 display terminal.

**Cradle:** The display monitor may be mounted in a cradle to provide a vertical tilt capability which allows the display operator to adjust for the best viewing angle within plus or minus 30 degrees. The cradle may be set on a counter top or be mounted to the under side of a horizontal surface. A bracket supplied for hanging the cradle provides a swivel capability.

**Magnetic Stripe Reader:** Has read capability only. The MSR is capable of reading the contents of ANSI Track 2 (75 bpi) on a credit or other plastic card.

**Dual Density Magnetic Stripe Reader:** Has read capability only. This device is capable of reading the contents of ISO Track 2 of a credit or other plastic card, or a magnetic striped savings book encoded at 210 bpi on a 4700 or 3600 encoder.

**Magnetic Stripe Reader/Encoder:** Has read and encode capability. The device is capable of reading the contents of Track 2 on a credit card (encoded at 75 bpi according to the ANSI Standard X4.16) or an ID card or passbook encoded at 210 bpi on a 4704 or 3604, or equivalent. The Magnetic Stripe Reader/Encoder is also capable of reading the contents of a track encoded at 210 bpi in accordance with JUCC Specifications. The device encodes at a density of 210 bpi in the IBM Passbook Format. The slot in the unit is designed to accept documents ranging in thickness from 0.25mm (0.010 in.) (excluding magnetic stripe), to 0.84mm (0.033 in.) (including magnetic stripe). It will accept plastic credit cards and ID cards or one cover of a magnetically-encoded passbook.

**Magnetic Stripe Reader/Encoder with Track 3 Read:** Has read and encode capability. The device is capable of reading the contents of ISO track 2 (at 75 bpi) and Track 3 (at 210 bpi) of credit or ID cards. The unit is also capable of reading and encoding a magnetic striped savings book encoded by a 4700 device or according to ISO DP8-84 or DIN 32744.

**Cleaning Card:** A card which is used for cleaning the magnetic head on a Magnetic Stripe Reader.

**Encrypting PIN Keypad:** A 12-key numeric keypad that has the Data Encryption Algorithm (DEA) implemented in hardware for Personal Identification Number (PIN) encryption within the keypad prior to transmission to a 4704 display terminal.

Includes ten data keys in the basic touch-pad telephone format with the Q and Z over the numeric "0". Two function keys are provided: "End" which signifies completion of correct entry and "Erase" which signifies incorrect entry requiring the entry to be repeated. An indicator light notifies the user when the encrypting PIN keypad is ready to accept entry. Data entered from the encrypting PIN keypad is not displayed on the 4704 to which it is attached. Prerequisites: A 4704. Note: When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

**Non-Encrypting PIN Keypad:** A 12-key numeric keypad for entry of a Personal Identification Number (PIN) to a 4704. Includes ten data keys in the basic touch-pad telephone format with the Q and Z over the numeric "0". Two function keys are provided: "End" which signifies completion of correct entry and "Erase" which signifies incorrect entry requiring the entry to be repeated. An indicator light notifies the user when the PIN keypad is ready to accept entry. Data entered from the PIN keypad is not displayed on the 4704 to which it is attached. Prerequisites: A 4704. Note: 4700 non-encrypting PIN keypad and 3600 PIN keypad not interchangeable. Note: When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

**Encrypting PIN Keypad Privacy Shield:** Attaches to the encrypting PIN keypad accessory. Provides a degree of visual shielding while allowing easy manipulation of the encrypting PIN keypad keys. Shielding is optimum where an observer is located directly behind the encrypting PIN keypad shield such as in the customary teller/customer relationship in a banking transaction.

**Non-Encrypting PIN Keypad Privacy Shield:** Attaches to the non-encrypting PIN keypad accessory. Provides a degree of visual shielding while allowing easy manipulation of the non-encrypting PIN keypad keys. Shielding is optimum where an observer is located directly behind the non-encrypting PIN keypad shield such as in the customary teller/customer relationship in a banking transaction.

**Keypad Protective Caps:** Clear plastic caps which cover each non-engraved keypad to protect the label from normal wear and tear. These may be ordered to replace, if required, the ones shipped with the 4704 keyboards.

**Keypad Label Sheets:** Sheets of 30 labels each for use on the 4704 keypads. The blank sheet contains 30 blank labels. The preprinted sheet contains 16 blank labels and the following preprinted labels: Digits 0 through 9, 00, 000, (. period), and (, comma).

**Document Holder:** A holder for documents to be fed by the operator into the 4723 document entry slot. The holder is to be placed on the table surface and positioned in front of 4723 where convenient to the customer. It provides added visibility of the documents as well as being convenient when feeding them into the 4723.

## ACCESSORY SUMMARY

Description	Feature No.	P/N
Fuses:		
5A Slow Blow, 100-120V, 50/60 Hz		512137
3A Slow Blow, 200-240V, 50Hz		5718367
Magnetic Stripe Reader	#4904	6096847
(75/210 bpi)	#4901	6019489
Magnetic Stripe Reader/Encoder	#4905	6096846
Filters:		
Green (5.5")	#9181	6019525
Green (9.0")	#9182	6019527
Amber (5.5")	#9191	6019526
Amber (9.0")	#9192	6019528
MSR Cleaning Card		6019483
Cradles:		
For (5.5") Monitor		6019529
For (9.0") Monitor		6019530
Encrypting PIN Keypad:		
Canadian-French		5680918
English		5666750
Japanese		5680944
Latin America Spanish		5680930
Non-Encrypting PIN Keypad:		
Canadian-French		5680932
English		5680905
Japanese		5680935
Latin America Spanish		5680929

**MACHINES**

PIN Privacy Shield	4707195
Keytop Protective Cap (one)	4585103
Keytop Labels:	
Sheet (blank)	6019424
Sheet (preprinted)	6019425

Document Holder

4732870

**SUPPLIES**

The 4701 uses a standard IBM Diskette type 1, 2 or 2D or equivalent.

## 4701 FINANCE COMMUNICATION CONTROLLER MODEL 5

### PURPOSE

A programmable controller for attachment of 4700 Finance Communication System terminals and 3600 Finance Communication System terminals to S/370, 303X, 308X, 3090, 4300 processors or 8100 Systems.

### MODEL 5

**Model 5 005:** A programmable controller with a base configuration of one diskette drive which accommodates one-sided removable diskette, one loop, 192K bytes of machine storage, and SDLC communication adapter.

**Customer Setup (CSU):** Machine and selected specify features.

**Machine Storage:** The base 192K bytes of machine storage are contiguous and are available to provide the storage as required for system control, selected device/function support and user programmable storage. Refer to the "IBM 4700 System Configurator", GC31-2017, for a comprehensive list of storage requirements and details on determining if the storage provided will be sufficient.

### HIGHLIGHTS

Controls all the functions of 4700 Finance Communication System and/or 3600 Finance Communication System terminals. Controls data transmission via SDLC between those terminals and the central processing site. Host data transmission via SDLC can be at speeds up to 9600 bps dependent on the other elements of the host connection facility. The base controller also offers integrated encryption to provide security of personal identification numbers (PINs), messages and software.

All 4700 system terminals (except 4704-2 and 4704-3) are attached by the loop which operates at speeds of 1200, 2400 or 4800 bps.

The 4701 Model 5 contains approximately 192K bytes of machine storage for use as system control, device/function support and user programmable storage. Refer to the "IBM 4700 System Configurator", GC31-2017, for detailed storage use information. One loop is provided. Houses a direct access diskette drive for one-sided removable diskettes which provides up to 0.25m of diskette storage for control and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). See "Special Features".

### System Attachment:

**Note:** See Program Product pages for host support programming information.

- S/370, 303X, 308X, 3090 or 4300 Processors: Remote attachment using SDLC via a 3704, 3705 or 3725 Communications Controller.
- 4331 Processors Remote or local attachment using SDLC via 4331 Communication Adapter feature.
- 8100 Units (8101, 8130, 8140): Remote attachment or direct connection using SDLC via 8100 unit Data Link features.
- 4341, 4361, 4381, 303X, 308X or 3090 processors: Remote attachment using SDLC via a 3720 Communication Controller.

Each 4701 controller operates in half-duplex mode. Duplex communication line operations are possible with multiple controllers attached to the line, one transmitting, while another receives. The 4701 Model 5 contains a communication adapter without business machine clocking and CCITT V.24/V.28 interface for direct connections or for attaching external modems operating via SDLC at speeds up to 9600 bps. The Data Circuit-terminating Equipment

(DCE) must provide its own clocking. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

Optionally, only when using SDLC, the X.21 Adapter for Switched Networks (#5656) or X.21 Adapter for Nonswitched Networks (#5655) are available in place of the standard CCITT interface. (UK Note: X21 attachment is not available in UK).

The 4701 can be programmed to operate independently when the host processor is unavailable and is capable of controlling all terminal functions, executing arithmetic and capturing data from the terminals for later transmission to the host processor.

**Transmission:** The 4701 operates over PTT or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

**Modems:** External modems operating at speeds up to 9600 bps for SDLC links may be used.

Modem	Speed (bps)	Lines
3833-1	2400	Nonsw voice grade
3834-1	4800	Nonsw voice grade
3863-1,2	2400/1200	Nonsw or Sw voice grade
3864-1,2	4800/2400	Nonsw or Sw voice grade
3865-1,2	9600/4800	Nonsw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3868-3,4	9600/4800	Nonsw voice grade
3872-1	2400/1200	Nonsw or Sw voice grade
3874	4800	Nonsw voice grade
5811-10	2400 to 9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400 to 9600	Nonsw baseband Rack mount version of 5811-20
5811-28		Nonsw baseband Rack mount version of 5811-20
5812-10	2400 to 9600	Nonsw baseband Rack mount version of 5812-10
5812-18		Nonsw baseband Rack mount version of 5812-10
5865-2,3	9600/7200/9600	Nonsw voice grade Rack mount version of 5865-2
5868-52		Limited distance COAM line
5979-L41	9600	

**Note:** 4-wire Switched Network Backup is available on 3863, 3864, 3865, 5965 and 5866 modems with feature #7953 installed. 2-wire Switched Network Back-up is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch / TP coordinator for country limitations.

**Customer Setup (CSU):** The 4701 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, refer to the GI section. One copy of the CSU Instructions is shipped with each 4701.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

1. Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.

2. Adequate site, system and other vendor preparation.
3. Price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
4. Receipt at the customer's receiving dock, unpacking and placement of the 4701.
5. Performing 4701 checkout in accordance with supplied procedures for initial installation or relocation, and updating of controller diskettes (at customer option).
6. Physical setup, connection of cables in protected customer access areas including loop cables and cable to host communication lines/modems.
7. Installation of the controller data and generation of the operational diskettes, at initial controller installation and for any subsequent controller data support release distribution.
8. Checking communications to the host processor.
9. Using the problem determination procedures provided with the 4701 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to requesting maintenance service (see "Maintenance" below).
10. Determining any required spares.
11. Notifying IBM of intent to relocate and following IBM instructions for relocation.

**Maintenance:** Maintenance of 4701s is available under IBM Maintenance agreement contracts for on-site maintenance. It is the customer's responsibility to setup the equipment and to determine when maintenance is required.

On-site maintenance is provided during the warranty period.

Customers with 4701s not covered by IBM Maintenance Agreements may have the unit(s) repaired (if the unit is repairable) for a time-and-material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer subsequently wants IBM Maintenance Agreement coverage, he may have the machine(s) inspected.

If, on the basis of the inspection, it is concluded that the state of the machine precludes normal maintenance, the machine is returned to the customer without charge.

If the unit requires repair, and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

**Deferred Central Facility Maintenance (DCFM):** Deferred Central Facility Maintenance (DCFM), is available, as an option, under an Amendment to the IBM Maintenance Agreement. DCFM allows for a reduction in the maintenance charge. The customer will provide a facility at which all Machines and/or Workstation Elements covered by a DCFM Amendment will be serviced. The customer will be responsible for determining when remedial maintenance is required and for transporting the Machines and/or Workstation Elements to and from the facility. The minimum quantity of Machines/Workstation Elements requiring remedial maintenance before the customer places a call for such maintenance is as follows:

Cat Units	Quantity
I 4701 Controllers	2
II 4704-1 Control Module )	
II 4704-1 Display Monitors )	6 Category
II 4704-2 Display Module )	II items
II 4704-3 Display Module )	(in any
II 4704 Keyboards )	combina-
II 4710 Printer )	tion)

II 4715 Printer )  
II 4720 Printer )

The combination of units in different categories is not allowed.

If the Customer selects to contract DCFM maintenance, IBM recommends spares in a quantity equal to 3% of the customer Inventory by device type. The minimum quantity of spares should be equal to the minimum quantity of Machines/Workstation Elements requiring remedial maintenance before the customer places a call for such maintenance.

The customer must provide a service facility with a loop connection and one 4704 Model 1 control module with display monitor and keyboard for maintenance purposes.

Annual maintenance charges apply for on-site and DCFM Maintenance offerings.

**Bibliography:** For information about 4701 publications, refer to the "4700 System Summary", GC31-2016.

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Power (AC, 1-phase): Specify #2999 to identify as Europe order. The 3-digit Country Code of the DP Machine Order Sheet is used to select the power supply which matches the most commonly used power source in each country.

A line cord of 3.0m (9.8 ft) and the country approved plug is provided at the time of shipment.

- Nomenclature:

Danish #2936	German #2929
English #2927	Italian #2932
Finnish #2921	Norwegian #2940
French #2928	Portuguese #2933
French/Dutch	Spanish #2931
Bilingual #2941	Swedish #2925

- Controller Data Support: The selected controller data support is supplied when the controller is shipped. It is the customer's responsibility to install it and any subsequent levels of the data supplied. Encryption capability via the DEA algorithm is included in the data support.

Media distribution of Controller Data, specify one of:

- #9491 (CSU) to identify the initial controller ordered for use with a S/370 or S/370-compatible host system location which requires the host media, or
- #9492 (CSU) to identify additional controllers per S/370 or S/370-compatible host system or for other controllers which do not require the host media.

If #9491 is specified, select the specify number of the desired media:

#9413 9/1600 Magnetic Tape (CSU)  
#9414 9/6250 Magnetic Tape (CSU)

If magnetic tape is not available on designated CPU, then the following media may be specified (DOS/VS users only):

#9431 80-column Cards (CSU)

When feature #9491 is specified, and first controller is not in the same location as the host CPU, specify #9496 and supplementary specifications (as comments of the order) are to be entered exactly as follows to indicate shipping address of the host system location:

Line 1 - C/O (Name of customer)  
Line 2 - Street Address (or P.O. Box)  
Line 3 - City, Country, Postal Code

This is the address to which the initial controller data tape will be automatically shipped for the controller ordered with #9491. Note: Specify code #9491 is used to provide Controller Data Media for only the initial controller attached to a host system location. Do not specify #9491 for more than one controller per host system as this will result in the unnecessary shipment of multiple DTR tapes or cards.

- Cables: In UK, specify #2835 for cabling if used on Datel service.

The following cables will automatically be shipped:

With Feature	Cable Assembly
#2835	#1743584 (0.3m)
#5655 or #5656	#5718197 (6m) and #5718195 (0.3m) Cable Assembly Extender

In all cases, except when feature code #5655 or #5656 is specified, cable assembly #8249921 (6m) will be shipped. See "Accessories" for information on loop cable, also see "4700 Finance Communication System, Installation Planning" (GC31-2018).

## SPECIAL FEATURES

**X.21 Adapter for Nonswitched Networks (#5655):** (Not available in UK) This feature provides an interface and 6 meter cable for attachment to an X.21 native nonswitched network with no changes to existing SNA/SDLC procedures for controlling nonswitched lines. This feature will operate only with SNA/SDLC procedures. It enables the user to connect DCEs whose electrical characteristics match those described in CCITT Recommendation X.21 for non-switched point-to-point and multipoint communication. The network establishes the data rate and supplies the clock. Speeds supported include 2400, 4800 and 9600 bps. Limitations: Cannot be installed with #5656. Maximum: One. Field Installation: Not recommended.

**X.21 Adapter for Switched Networks (#5656):** (Not available in UK) An interface adapter and 6m cable for attachment to the X.21 Switched Network. SDLC Communications at speeds of 2400, 4800 and 9600 bps are supported. Limitations: Cannot be installed with #5655. Field Installation: Not recommended.

## MODEL CONVERSIONS

Model changes between model 1 or 2 and 5 are available at time of manufacture only.

## ACCESSORIES

**Keylock Cable Assembly (P/N 6018769):** Replacement keylock cable assembly (used to load Master key) may be purchased from IBM. Order via MES from plant of manufacture.

**Cables:** IBM shielded twisted-pair is required for attaching 4700 units. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories. For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide" (GA27-3361). For pricing and ordering information, refer to the System Supplies operation within your country.

Other applicable cable assemblies and associated accessories, can be purchased from IBM. See "Physical Planning Manual" (GC31-2018) for cable and connector specifications.

Cable Assembly Number	Use	Length
1743584	Cable Assembly - Datel (UK only)	0.3m (1 ft)
6018886	Cable Assembly - Multi use loop	4.27m (14 ft)
5718197	Cable Assembly - X21	6m (20 ft)
5718195	Cable Extender - X21	0.3m (1 ft)
8249921	Cable Assy, (Inch) - EIA/CCITT	6m (20 ft)

The following are "X" length cables with maximum length shown.

1563155 Loop Cable Assembly 610m (2,000 ft)

For attachment of 3262, 3287, 3278 to a 4701:

**Cables:** IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories. Maximum distance from controller to terminal is 610m (2,000 ft) using shielded twisted-pair cable or 1,500m (4,920 ft) using coaxial cable.

**Twisted-pair Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide" (GA27-3361). For pricing and ordering information, refer to the System Supplies operation within your country.

**Coaxial cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning" (GA27-2787), and "Coaxial Cable and Associated Manual" (GA27-2805).

2577672	Cable Assembly 1,500m (4,920 ft) - indoor
or	
323921	Coax Wire 1,500m (4,920 ft) and
1836418	Connector Kit

**Note:** Standard length communication cables are automatically shipped with 4701.

## GENERAL ACCESSORIES

**Filters:** Anti-glare filters protect against light reflection and provide either a yellow character display on a brown background (amber) or bright green characters on a dark green background (green). One filter is provided with each 4700 display terminal.

**Cradle:** The display monitor may be mounted in a cradle to provide a vertical tilt capability which allows the display operator to adjust for the best viewing angle within plus or minus 30 degrees. The cradle may be set on a counter top or be mounted to the under side of a horizontal surface. A bracket supplied for hanging the cradle provides a swivel capability.

**Magnetic Stripe Reader:** Has read capability only. The MSR is capable of reading the contents of ANSI Track 2 (75 bpi) on a credit or other plastic card.

**Dual Density Magnetic Stripe Reader:** Has read capability only. This device is capable of reading the contents of ISO Track 2 of a credit or other plastic card, or a magnetic striped savings book encoded at 210 bpi on a 4700 or 3600 encoder.

**Magnetic Stripe Reader with Track 3 Read:** Has read capability only. This device is capable of reading ISO Track 2 (at 75 bpi) and

Track 3 (at 210 bpi) of credit or ID cards. In addition, the device will read magnetic striped savings books encoded by a 4700 device or according to ISO DP8484 or DIN 32744.

**Magnetic Stripe Reader/Encoder:** Has read and encode capability. The device is capable of reading the contents of Track 2 on a credit card (encoded at 75 bpi according to the ANSI Standard X4.16) or an ID card or passbook encoded at 210 bpi on a 4704 or 3604, or equivalent. The device encodes at a density of 210 bpi in the IBM Passbook Format. The slot in the unit is designed to accept documents ranging in thickness from 0.25mm (0.010 in.) (excluding magnetic stripe), to 0.84mm (0.033 in.) (including magnetic stripe). It will accept plastic credit cards and ID cards or one cover of a magnetically encoded passbook.

**Magnetic Stripe Reader/Encoder with Track 3 Read:** Has read and encode capability. The device is capable of reading the contents of ISO track 2 (at 75 bpi) and Track 3 (at 210 bpi) of credit or ID cards. The unit is also capable of reading and encoding a magnetic striped savings book encoded by a 4700 device or according to ISO DP8484 or DIN 32744.

**Cleaning Card:** A card which is used for cleaning the magnetic head on a Magnetic Stripe Reader.

**Encrypting PIN Keypad:** A 12-key numeric keypad that has the data encryption algorithm (DEA) implemented in hardware for personal identification number (PIN) encryption within the keypad prior to transmission to a 4704 display terminal.

Includes ten data keys in the basic touch-pad telephone format with the Q and Z over the numeric "0". Two function keys are provided: "End" which signifies completion of correct entry and "Erase" which signifies incorrect entry requiring the entry to be repeated. An indicator light notifies the user when the encrypting PIN keypad is ready to accept entry. Data entered from the encrypting PIN keypad is not displayed on the 4704 to which it is attached. Prerequisites: A 4704.

**Note:** When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

**Non-Encrypting PIN Keypad:** A 12-key numeric keypad for entry of a Personal Identification Number (PIN) to a 4704. Includes ten data keys in the basic touch-pad telephone format with the Q and Z over the numeric "0". Two function keys are provided: "End" which signifies completion of correct entry and "Erase" which signifies incorrect entry requiring the entry to be repeated. An indicator light notifies the user when the PIN keypad is ready to accept entry. Data entered from the PIN keypad is not displayed on the 4704 to which it is attached. Prerequisites: A 4704.

**Note:** 4700 non-encrypting PIN keypad and 3600 PIN keypad not interchangeable.

**Note:** When ordering, select only one of the two possible Q and Z formats to avoid mixed format input data.

**Encrypting PIN Keypad Privacy Shield:** Attaches to the encrypting PIN keypad accessory. Provides a degree of visual shielding while allowing easy manipulation of the encrypting PIN keypad keys. Shielding is optimum where an observer is located directly behind the encrypting PIN keypad shield such as in the customary teller/customer relationship in a banking transaction.

**Non-Encrypting PIN Keypad Privacy Shield:** Attaches to the non-encrypting PIN keypad accessory. Provides a degree of visual shielding while allowing easy manipulation of the non-encrypting PIN keypad keys. Shielding is optimum where an observer is located directly behind the non-encrypting PIN keypad shield such as in the customary teller/customer relationship in a banking transaction.

**Keypad Protective Caps:** Clear plastic caps which cover each non-engraved keypad to protect the label from normal wear and tear. These may be ordered to replace, if required, the ones shipped with the 4704 keyboards.

**Keypad Label Sheets:** Sheets of 30 labels each for use on the 4704 keypads. The blank sheet contains 30 blank labels. The preprinted sheet contains 16 blank labels and the following preprinted labels: Digits 0 through 9, 00, 000, ( . period), and ( , comma).

**Document Holder:** A holder for documents to be fed by the operator into the 4723 document entry slot. The holder is to be placed on the table surface and positioned in front of 4723 where convenient to the customer. It provides added visibility of the documents as well as being convenient when feeding them into the 4723.

## ACCESSORY SUMMARY

- Filter, Green (5.5") (P/N 6019525)
- Filter, Green (9.0") (P/N 6019527)
- Filter, Green (5.5") (P/N 6019528)
- Filter, Amber (9.0") (P/N 6019529)
- Cradles, for (5.5") Monitor (#3201, P/N 6019529)
- Cradles, for (9.0") Monitor (#3202, P/N 6019530)
- MSR (Magnetic Stripe Reader) (#4904, P/N 6096847)
- MSR (Magnetic Stripe Reader), Dual Density (#4901, P/N 6019489)
- MSR (Magnetic Stripe Reader), w/ Track 3 Read (#4903, P/N 6096848)
- MSR/E (Magnetic Stripe Reader/Encoder) (#4905, P/N 6096846)
- MSR/E (Magnetic Stripe Reader/Encoder), w/ Track 3 Read (#4907, P/N 6096849)
- Cleaning Card, MSR (#3305, P/N 6019483)
- Encrypting PIN Keypad, German (#3303G0, P/N 5680919)
- Encrypting PIN Keypad, English (#3303U0, P/N 5667650)
- Encrypting PIN Keypad, Dutch (Belgian) (#3303B0, P/N 5680945)
- Encrypting PIN Keypad, Danish (#3303D0, P/N 5680929)
- Encrypting PIN Keypad, French (#3303F0, P/N 5680918)
- Encrypting PIN Keypad, Italian (#3303I0, P/N 5680931)
- Encrypting PIN Keypad, Spanish (#3303T0, P/N 5680930)
- Encrypting PIN Keypad, Swedish (#3303S0, P/N 5680943)
- Non-Encrypting PIN keypad, German (#3301G0, P/N 5680911)
- Non-Encrypting PIN keypad, English (#3301U0, P/N 5680905)
- Non-Encrypting PIN keypad, Dutch (Belgian) (#3301B0, P/N 5680939)
- Non-Encrypting PIN keypad, Danish (#3301D0, P/N 5680914)
- Non-Encrypting PIN keypad, French (#3301F0, P/N 5680917)
- Non-Encrypting PIN keypad, Italian (#3301I0, P/N 5680920)
- Non-Encrypting PIN keypad, Spanish (#3301T0, P/N 5680923)
- Non-Encrypting PIN keypad, Swedish (#3301S0, P/N 5680926)
- Encrypting PIN Privacy Shield, PIN Keypad Shield (#3304, P/N 4707195)
- Keypad Caps, Keypad Protective Cap (one) (#3306, P/N 4585103)
- Keypad Labels, Sheet (blank) (#3307, P/N 6019424)
- Keypad Labels, Sheet (preprinted) (#3308, P/N 6019425)
- Fuses, 5A Slow Blow (100-120V, 50/60 Hz) (P/N 512137)
- Fuses, 3A Slow Blow (200-240V, 50 Hz) (P/N 5718367)
- Document Holder (P/N 4732870)

## SUPPLIES

**Diskettes:** The 4701 uses a standard IBM Diskette 1, or equivalent.

Re-order number: 2305845  
Unit of measure: 1 slipcase of 10 diskettes  
Minimum order quantity: 10 diskettes  
Usable capacity: 284,160 bytes

## 4702 BRANCH AUTOMATION PROCESSOR

### PURPOSE

A programmable processor for attachment of 4700 Finance Communication System terminals and 3600 Finance Communication System terminals to S/370, 303X, 308X, 3090 or 4300 Processors, S/34, S/36, S/38 or 8100 Systems.

### MODELS

**Model 1 001:** A programmable processor with a base configuration of 512K-bytes of machine storage, two Loop adapters or a four-port Cluster Adapter, Host communication adapter, and a 1.2M-byte Diskette Drive which accommodates 5.25 inch high density removable diskettes. May be upgraded to provide terminal attachment via a maximum of six Loops, 32 ports of Cluster Adapter, and five ALA ports. (Some features are mutually exclusive.) May also be upgraded to provide 4.0M-bytes of machine storage, one additional 1.2M-byte Diskette Drive and a maximum of 60M-bytes of internal Fixed Disk Storage capacity. Additional Fixed Disk Storage capacity can be provided with the 4708 Disk Unit Models 5 or 6.

**Customer Setup (CSU):** The 4702 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, contact IBM. One copy of the CSU Instructions and diagnostic diskette are shipped with each 4702. The CSU allowance is four days.

### HIGHLIGHTS

- Controls data transmission between terminals and the central processing site. Host data transmission via RS-232-C interface can be at speeds up to 19,200 bps or via BSC at speeds up to 4800 bps depending on the other elements of the host connection facility. Host data transmission via X.21 and X.25 communications is also supported. A second host interface is supported for SDLC EIA/CCITT, or X.21 non-switched.
- Communication Link Limit information will be found in the "IBM 4700 System Configurator" (GC31-2017) for other host link and ALA options. The base processor also offers data encryption to provide security capability of personal identification numbers (PINs), messages and software.
- Has 512K-bytes of machine storage with 512K-byte or 1.0M-byte additional increments available for a total of 4.0M-bytes. A minimum microcode storage area is required for system control and selected device, feature, or function support. The remainder is available for user-programmable storage. Refer to "IBM 4700 System Configurator" (GC31-2017) for a comprehensive list of storage requirements and details on determining the amount of additional storage, if any, that is required.
- Controls all of the functions of 4700 Finance Communication System and/or 3600 Finance Communication System terminals. All 4700 system terminals (except 4704-2 and 4704-3) are attached by Loops which may be selected to operate at speeds of 1200, 2400 or 4800 bps. The 4702 can have two Loops in the base with two optional features providing a maximum of six Loops. A four port Cluster Adapter may be specified in place of the two Loops in the base machine.
- Houses a 1.2M-byte Diskette Drive for 5.25 inch high density removable diskettes for storage of processor data and user programs, plus temporary and permanent storage for user data (sequential logging, random retrieval of data records, etc.). One additional 1.2M-byte Diskette Drive may be featured. Also, a maximum capacity of 60M-bytes of fixed disk storage (Maximum two disk drives) may be featured internally for temporary and permanent storage of user data. Additional fixed disk storage capacity can be provided via the 4708 Disk Unit Models 5 and/or 6.

- Optional Cluster Adapter feature and Fan-Out Cluster Adapter features are available to provide high-speed workstation attachment locally for 3178 mdl C1, C2, 3180 mdl 1, 3278 mdl 2, 5, 52, 3279 mdl 2A, S2A, 2B, S2B, 02X, 4704 mdl 2, 3 Displays, 5210 mdl G01, G02 Printwheel Printers, 3287 mdl 1, 2 and 3283 mdl 52 Character Printers, 3262 mdl 3, 13 Line Printers, (Canada Only > 5150 or 5160 XT Personal Computer, <) and 6580 Displaywriter System.
- Optional ALA Communications Ports with either EIA/CCITT interface, Fan-Out Communications interface, or X.21 non-switched interface are available to attach 3624 ATM and/or 4730 Personal Banking Machines. (See ALA Interface Specify Section.)

**Streaming Tape Attachment Features:** Attaches the Streaming Tape Drive (#6157) to the 4702 Processor. The Streaming Tape Attachment Features when used with the Streaming Tape Drive provides high speed save/restore capability for 30MB 5-1/4 inch hard file in the 4702 Processor. It is recommended that streaming tape operation (Save/Restore) be done during non-operational periods because of the following:

1. A disk being saved/restored to/from a streaming tape, CAN NOT BE USED by any application program for the duration of the streaming operation.
2. References to other DASD devices will take significantly longer than normal during a streaming operation. See related product documentation for details.

(See Non-Communication Features section.)

**Customer Responsibilities:** All customers must be advised that their responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
- Receipt at the customer's receiving dock, unpacking and set-up of the unit.
- Performing 4702 checkout in accordance with supplied procedures for initial installation or relocation, and updating of processor diskettes (at customer option).
- Physical setup, connection of cables in protected customer access areas including loop cables, cable to host communication lines/modems, and cables for Disk Storage features.
- Installation of the processor data support and generation of the operational diskettes at initial processor installation and for any subsequent release distribution.
- Checking communications to the host processor.
- Security for erasure of data from a failing fixed disk storage feature being returned to IBM. It is IBM's practice to erase any remaining data on a returned disk before reusing it.
- Using the problem determination procedures provided with the 4702 to determine the failing element and filling out the appropriate 4700 Problem Report prior to forwarding the failing element to an IBM designated location or requesting IBM Service (see "Maintenance" below).
- Determining the need for any required spares.
- Follow IBM instructions regarding relocation.

**Publications:** For information on 4700 publications, refer to the "4700 System Summary" (GC31-2016).

## System Attachment

**Note:** See Program Product pages for host support programming information.

**S/370, 303X, 308X, 3090 or 43XX Processors:** Remote attachment using SDLC or BSC-3 via a 3704, 3705 or 3725 Communications Processor. The X.21 adapter for non-switched network, or switched network, and X.25 adapter are available in place of the standard EIA/CCITT interface. See Host Communication Specify Section. The maximum speed supported is 9600 bps for 3704 and 3705, and 19,200 bps for the 3725.

**43XX Processors:** Local attachment via the Local Attachment feature on the 43XX or remote attachment via the Communication Adapter on the 43XX requires specify #9639 for SDLC or specify #9640 for BSC-3. The maximum speed supported is 9600 bps.

**8100 System:** Remote attachment or direct connection using SDLC via 8100 unit Data Link features. The maximum speed supported is 9600 bps. These attachments are supported by the DPPX/DSC capability.

**S/34 or S/36 Processors:** Remote attachment or local attachment using SDLC via S/34 or S/36 Communication Adapter feature. The maximum speed supported is 9600 bps.

**S/38 Processors:** Remote attachment using SNA/SDLC via S/38 Communication Attachment.

**Note:** See IBM for a list of applicable PRPQs.

Each 4702 operates in half-duplex mode. When operating in an SNA environment, duplex communication line operations are possible (except S/34 or S/36) with multiple 4702s attached to the line, one 4702 transmitting, while another receives. The 4702 contains a communication adapter without business machine clocking and CCITT V.24/V.28 interface for direct connections or for attaching external modems operating at speeds up to 19,200 bps or BSC-3 with optional BSC Communications specify #9640 at speeds up to 4800 bps. The Data Circuit Terminating Equipment (DCE) must provide its own clocking.

The 4702 can be programmed to operate independently when the host processor is unavailable. It is also capable of controlling all terminal functions, executing arithmetic and capturing data from the terminals for later transmission to the host processor.

When used either with a non-S/370 compatible host system or without a host system, the Local Configuration Facility (LCF) may be ordered. See Controller Data Support Specify Section.

**Transmission:** The 4702 operates over common carrier-provided or equivalent customer-owned communication facilities. For information concerning these facilities, see M2700 pages.

**Modems:** External modems operating at speeds from 1200 bps to 19,200 bps for RS-232-C links or 4800 bps for BSC-3 links may be used. External modems capable of supplying data clocking such as 386X, 387X, 383X, 586X, 581X, and 5821 are required. Non-IBM modems may be attached subject to the IBM Multiple Supplier Systems Policy. See M2700 pages for further information.

**Maintenance:** IBM On-Site Exchange warranty service is included in the purchase price of the machine and is provided under the Agreement for Purchase of IBM Machines and Amendment for IBM Service/Exchange Center Service.

Maintenance service is available under the IBM Maintenance Agreement (Z125-3275) and the Amendment for IBM Service/Exchange Center Service (Z125-3385). The 4702 has two service offerings: IBM On-Site Exchange and Customer Carry-In Exchange. Service offerings may vary by Country. Alternate service offerings may be available in some countries. The repair of defective elements not covered by warranty or a maintenance agreement is only provided at the IBM Repair Center on an hourly service basis. If the 4702 is not covered by an IBM Maintenance Agreement, IBM Hourly Service is available at the customer site.

It is the customer's responsibility to setup the equipment and to determine when maintenance is required. If the customer has Customer Carry-In Exchange, it is the customer's responsibility to disconnect the element, transport it to the designated IBM location, and exchange the element for a new one.

## SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

- Voltage: Specify #2998. Specify codes may not be required when ordering a 4702. If no code is specified the appropriate default will be assumed based on the three-digit country code. Default countries are shown below:

Argentina	New Zealand
Australia	Sri Lanka
Chile	Uruguay

All of the above will be shipped with 220/240V AC, 50 Hz.

Brazil	Peru
Canada	Philippines
Dominican Republic	South Korea
Ecuador	Taiwan
Japan	Venezuela
Mexico	

All of the above will be shipped with 50/60 Hz, 120V.

For countries not listed above, specify:

50 Hz	60 Hz
100V-110V #9893	100V-120V #9892
200V-240V #9894	

(Canada only > Specify #9890 for locking plug. If not specified a non-locking plug will be provided (for 60 Hz, 120V, 1-phase). <)

(Japan Only > Specify #9890 for locking plug. If not specified a non-locking plug will be provided (for voltages under 200V). <)

(Except Canada and Japan > The 3-digit WT Country Code of the DP Machine Order Sheet is used to select a power plug which matches the most commonly-used power supply in each country. If an AC power source other than the most common in the country is specified, and it is incompatible with the power plug commonly supplied, no power cord will be shipped unless a country RPQ is initiated. <)

A line cord of 3.0m (9.8 ft) and the country approved plug will be provided at the time of shipment.

- Machine Nomenclature:

The machines will be shipped to countries with the following nomenclature defaults:

Country	Nomenclature
Argentina	Spanish
Australia	English
Brazil	Portuguese
Canada	Canadian/French
Chile	Spanish
Dominican Republic	Spanish
Ecuador	Spanish
Japan	Japanese
Mexico	Spanish
New Zealand	English
Peru	Spanish
Philippines	English
South Korea	English

Sri Lanka	English
Taiwan	English
Uruguay	Spanish
Venezuela	Spanish

If exceptions are required or if none is listed for your country, specify from the following list:

English #2927  
Canadian/French Bilingual #2934  
Portuguese #2933  
Spanish #2931

- Host Communication Interface: These Specify codes may be field converted via an RPQ. Specify one of the following on each order:

SDLC (RS-232-C)	#9639
BSC-3 (RS-232-C)	#9640
X.21 Switched	#9641
X.21 Non-Switched	#9642
X.25 (RS-232-C)	#9643
X.25 Non-Switched	#9644

**SDLC or X.25 RS-232-C Communications Without Business Machine Clocking (#9639, #9643):** Provides an interface for attachment to either SDLC #9639, or X.25 #9643 Networks.

**BSC RS-232-C Communications Without Business Machine Clocking (#9640):** Required for attachment to communications lines through an external modem which has internal clocking at speeds up to 4800 bps when operating with Binary Synchronous Communications BSC-3.

**X.21 Interface for X.21 Switched or X.21 or X.25 Non-Switched Network (#9641, #9642, #9644):** This adapter provides an interface and 6.0m cable for attachment to an X.21 native switched or X.21 or X.25 non-switched network with no changes to existing SNA/SDLC procedures for controlling non-switched lines. This feature will operate only with SNA/SDLC procedures. It enables the user to connect DCEs whose electrical characteristics match those described in CCITT Recommendation X.21 for non-switched point-to-point and multi-point communication. The network establishes the data rate and supplies the clock. Speeds supported include 2400, 4800 and 9600 bps. Also provides an interface adapter and six meter cable for attachment to the X.21 Switched Network.

Summary of X.21 and X.25 Networks supported:

	Facility	
X.21	L	Switched Data Network (X series)
X.21	M	Non-Switched Data Network (V series)
X.21	N	Non-Switched Data Network (X series)
X.25	P	Packet Network (P series)
X.25	Q	Packet Network (X series)

**Second Host Interface (One Only):** These Specify codes may be field installed. Specify one of the following: (Prerequisite is ALA Port #3702)

SDLC (RS-232-C)	#9650 (Only allowed with #9639)
X.21 Non-Switched	#9651 (Only allowed with #9642)

**SDLC RS-232-C Interface (#9645):** Provides the appropriate cables and interface logic necessary to attach an external modem for communications attachment to remote 4730 Personal Banking Machines via SDLC at speeds up to 9600 bps, or 3624's via SDLC at 2400 bps or 4800 bps. Non-IBM modems may be attached subject to the Multiple Supplier Systems Policy.

**Fan-Out Communications Interface (#9646):** Permits local attachment of up to four 4730 Personal Banking Machines or 3624 ATMs

communicating via SDLC. Prerequisites: #3702 and "X" length cable. Speed switch must be set on the card. Maximum length cable is indicated below.

Speed	Maximum Cable Length
9600 bps	30.48m (100 ft)
4800 bps	60.96m (200 ft)
2400 bps	121.92m (400 ft)

**Note:** All attached 4730s or 3624s will run at the selected speed. 3624s run at 2400 bps or 4800 bps only.

**X.21 Non-Switched Interface (#9647):** Provides the appropriate interface for device attachment to the 4702 Controller via an X.21 non-switched Network.

**Base Controller Adapter:** Specify one of the following on each order:

Two Loop Adapter	#9649
Four Port Cluster Adapter	#9638

The selected controller data support is supplied when the controller is shipped. It is the customer's responsibility to install it and any subsequent levels of the data support supplied. Encryption capability via the DEA algorithm is included in the data support. This encryption capability is not available in Surinam or Hungary.

**Ordering Information for 4700 Controller Data:** There are three specify codes (#9490, #9491, and #9492) for ordering controller data for the 4700 controllers. These specify codes enable the user to order each controller with the capability of creating operational diskettes wither at a S/370 or S/370-compatible host system and/or at the controller site. When ordering a controller for which it is intended that operational diskettes will be generated at the controller site, use specify code #9490. When ordering the initial controller for a user who intends to generate operational diskettes using a S/370 or S/370 compatible host system, use specify #9491, and when ordering additional controllers use specify code #9492.

Distribution of controller data media, specify #9490, #9491, or #9492 as follows:

Specify #9490 identifies a controller which requires the capability to create operational diskettes at the controller using the Local Configuration Facility (LCF). Three controller data diskettes will be shipped with the controller.

1. Installation Diskette
2. LCF Pre-Operational Diskette
3. LCF Program Diskette

LCF requires a 4704 Display Terminal with the Alphameric Keyboard (#4662) for the necessary dialog between the user and the controller. An Additional 1.2M-byte Diskette Drive (#1046) is also recommended on at least one 4702 per enterprise to do diskette copy for backup or distribution of LCF Operational diskettes to other branch 4702 controllers.

**Note:** #9490 should be used to provide Controller Data Media for only those controllers that require a system generation facility at the controller. Unnecessary shipment of multiple diskettes will result if specified when not required.

OR

Specify #9491 identifies the initial controller used with a S/370 or S/370 compatible host system location. The user will receive a DTR tape delivered to the address described below and an installation diskette included with the controller.

**Note:** Do not specify #9491 for more than one controller per host system as this will result in the unnecessary shipment of multiple DTR tapes.

If #9491 is specified, select the specify code of the desired media.

#9413	9/1600 Magnetic Tape (CSU)
#9414	9/6250 Magnetic Tape (CSU)

Specify #9492 is used to order additional controllers when neither a DTR nor a pre-operational diskette is required, or when operational diskette creation is not required.

Any time #9490 or #9491 is specified, enter supplementary specifications (via AAS order entry) exactly as follows to indicate shipping address of the Host System Location. Specify #9490 or #9491 must be specified as first controller and the supplemental address completed. Do not specify #9492 for all controllers for a single customer.

Line 1 - C/O (Name of customer)  
Line 2 - Street Address (or P.O. Box)  
Line 3 - City, Country, Postal Code.

This is the address to which the initial controller data tape will automatically be shipped.

**Cables:** See "Accessories" for additional information. See also "4700 Finance Communication System, Installation Planning Manual" (GC31-2018).

The following cable assembly will automatically be shipped:

Feature/Specify	With Cable Assembly
#2835	#1743584 (0.3m)
#9641, #9642	
#9644, #9651	#6423155 (6.0m) and #6423322 (0.3m) Cable assembly extender
#9639, #9640, #9643, #9645, #9650	#6423153 (6.0m) or #6423153 (6.0m) with metric screws

## SPECIAL FEATURES

**Note:** Unless otherwise stated, all features available for field installation are customer installable, and consequently there is no charge for removal.

### Non-Communications Features

The 4702 has a maximum of four card locations available for 512K-byte or 1.0M-byte additional machine storage features. The maximum machine storage capacity including the 512K-bytes in the base is limited to 4.0M-bytes. The maximum machine storage of 4.0M-bytes cannot be achieved by populating the four card locations with 512K-byte storage features.

**512K-Byte Storage (#1011):** Provides an additional 512K-bytes of machine storage. Limitation: The combination of features #1011, #1012 cannot exceed four. Maximum: Four. Field Installation: Yes.

**1.0M Byte Storage (#1012):** Provides an additional 1.0M-bytes of machine storage. Limitation: The combination of features #1011, #1012 cannot exceed four. Maximum: Three. Field Installation: Yes.

**1.2M-Byte Diskette Drive (#1046):** Provides approximately 1.2M-bytes of additional diskette storage via a second diskette drive for high density diskettes. Maximum: One. Field Installation: Yes.

**30M-Byte Disk Drive (#1085):** Provides 30 M-bytes of fixed disk storage. Maximum: Two. Limitations: One or two #1085s. Field Installation: Yes.

**Cluster Adapter (#3102):** Provides four ports for the local attachment of up to four devices with a mix of 3262 mdl 3, 13 Line Printers, 3178 mdls C1, C2, 3180 mdl 1, 3191 Mdl A1X, B1X, 3278 mdl 2, 5 (Japan Only), 52<) Display Stations, 3279 mdl 2A, S2A, 2B, S2B, 02X, 4704 mdl 2, 3 Display Stations, (Japan Only> 3283 mdl 52, <) (Canada Only> 5150 or 5160 XT Personal Computer, <) 5210 mdls

G01, G02 Printwheel Printers, and 3287 mdl 1, 2 Printers, 6580 Displaywriter System. When attaching the 3180 mdl 1 Display Station, only the 1,920 and 3,564 character screen sizes are supported. The 4702 does not support all 3180 functions. When attaching the 3278 mdl 2 Display Station to the device cluster adapter, no-charge 3278 RPQ 8K0880 is required. (Japan Only> When attaching the 3278 Display Station mdl 52 to the Device Cluster Adapter, no-charge 3278 RPQ 7F0148 is required.<) When attaching Displaywriter via the 3278 emulation adapter, file transfer is not supported on the 4702. See M6580 (Canada Only), 5150 or 5160<) pages for additional prerequisites and/or limitations. Limitations: Maximum distance from processor to terminal is 1,500 meters (4,920 ft). The 5210 printer is supported in SCS mode only. Cannot be ordered if specify #9638. The combination of #3102, #3103, #4746, and #3702 cannot exceed ten. Maximum: One. Field Installation: Yes.

**Fan-Out Cluster Adapter (#3103):** Provides eight ports for the local attachment of up to eight Cluster Adapter terminals. Limitations: Attaches to one #3102 or #9638 port (net increase of seven ports). The combination of #3102, #3103, #3702, and #4746 cannot exceed ten. Maximum: Four. Field Installation: Yes. Prerequisites: #3102 or #9638.

**Disk Unit Redrive Adapter (#3703):** Provides the attachment capability for one 4708 Disk Unit models 5 or 6. Maximum: One. Limitation: The 4702 can not IPL via this adapter. Field Installation: Yes.

**6157 Attachment Feature (#3733):** Provides the attachment feature in the 4702 Processor. Maximum: One. Field Installation: Yes. These features are field installable via RPQs.

**Attachment Feature and Switch Function (#3734):** Provides the attachment feature and switch function in a 4708 Disk Unit to attach the 6157 to a 4702 Processor and 4708 Disk Unit or attach a 6157 to dual 4708s.

**Loop Adapter (#4746):** Each adapter provides two additional loop attachments of 4700 Finance Communication System or 3600 Finance Communication System Terminals. Limitation: The combination of #3102, #3103, #3702, and #4746 cannot exceed ten. Maximum: Two, providing four additional loops for a total of six. Field Installation: Yes.

### ALA Communication Features

**ALA Port (#3702):** Required to communicate with local or remote 4730 Personal Banking Machines at speeds from 1200 bps to 9600 bps, or 3624 ATMs at speeds of 2400 bps or 4800 bps. Also required for Second Host Interface. Limitation: The combination of #3102, #3103, #3702 and #4746 cannot exceed ten. Maximum: Five. Field Installation: Yes. Specify: See specify section for second host interface or ALA interface specifies.

### ACCESSORIES

**Keylock Cable Assembly:** Replacement keylock cable assembly (used to load Master key) may be purchased from IBM. Order via MES from plant of manufacture Order P/N 6328560.

**Cables:** Shielded twisted-pair cable is available for attaching 4700 terminals to the 4702 controller in a loop configuration. The loop can be implemented using the IBM Cabling System or banking loop cable. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories.

**IBM Cabling System:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide" (GA27-3361). For pricing and ordering information, refer to the System Supplies operation within your country.

**Banking Loop Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "4700 Finance Communication System - Installation Planning Manual" (GC31-2018).

## MACHINES

**Note:** For each Loop Adapter card (either base or feature) two 1.8m cables (P/N 6167476) will be shipped.

The following is "X" length cable with maximum length shown:

1563155: Loop Cable Assembly - 610m (2,000 ft)

IBM shielded twisted-pair cable (or equivalent) or coaxial cable is required for product attachment. Cable and associated accessories can be purchased from IBM or a customer-selected source. The customer is responsible for installation and maintenance of the cable and associated accessories. maximum distance from controller to terminal is 610m (2,000 ft) using shielded twisted-pair cable or 1,500m (4,290 ft) using coaxial cable.

**Twisted-Pair Cable:** For proper identification, installation and application of cable and associated accessories, refer to "IBM Cabling System - Planning and Installation Guide" (GA27-3361). For pricing and ordering information, refer to the System Supplies operation within your country.

**Coaxial Cable:** For proper identification, installation, and application of cable and associated accessories, refer to "IBM 3270 Installation Manual - Physical Planning" (GA27-2787) and "Coaxial Cable and Associated Manual" (GA27-2805).

**Loop Repeater (P/N 4400002):** Plugs into the loop cable and re-drives all signals being transmitted in a 3600 or 4700 Finance Communication System. Each Loop Repeater contains loop redriving capabilities which allow for the extension of the loop cable length by 2,000 feet. Loop Repeaters may be employed on a loop to extend its overall length to a maximum of 20,000 cable-feet. The unit can be physically mounted on a wall in an out-of-the-way location. Pre-

requisites: An operating 4700 System Local Loop or Remote Sub-Loop. For Ordering: See IBM.

	Machine	P/N
Loop Repeater	4701	4400002
Loop Repeater	4702	4400002

## GENERAL ACCESSORIES

Information regarding Accessories for other IBM 4700 Finance Communication System machine types such as 4704, 4710, and 4720, can be found in their respective sales pages.

## SUPPLIES

### Diskette 2HC

Re-order number: 6109660  
Unit of measure: 1 slipcase (SC) of 10 diskettes  
Minimum order quantity: 10 diskettes  
Usable capacity: 1.2M-byte

### Diskette 2HC

Re-order number: 6109661  
Unit of measure: 1 library case (LC) of 10 diskettes  
Minimum order quantity: 10 diskettes  
Usable capacity: 1.2M-byte

## 4704 FINANCE COMMUNICATION DISPLAY STATION

### PURPOSE

A modular user-configurable 480 or 1,920 character CRT display and keyboard station for input and output in interactive banking applications.

Three display models with a variety of keyboards provide flexibility to offer a wide range of display functions and keyboard configurations.

### MODELS 1, 2, 3

**Model 001:** A loop-attached keyboard display for use in interactive banking applications.

**Model 002:** A DCA-attached keyboard display with 9" CRT for use in interactive banking or administrative applications.

**Model 003:** A DCA-attached keyboard display with 12" CRT for use in interactive banking or administrative applications.

### Prerequisites

**Model 1:** An available position on a loop of a 4700 Finance Communication System or 3600 Finance Communication System. One Display Monitor and filter, and one keyboard type must be selected to complete the order (see "Special Features"), unless the unit is being ordered for use as a spare and then the specify for the Display Control Module only, must be indicated (see "Specify").

**Model 2 or 3:** An available position on the 4700 DCA feature. One filter and one keyboard type must be selected to complete the order (see "Special Features"), unless the unit is being ordered as a spare and then the specify for the Display Module must be indicated (see "Specify").

**Customer Setup (CSU):** Machine and selected features.

### HIGHLIGHTS

**Model 1:** A basic display station consists of a Display Control Module, a Display Monitor (5.5" or 9") with filter and a Keyboard. The Display Control Module provides capability to attach to the 4700 or 3600 System Controller via a loop connection.

**Model 2 or 3:** A basic display station consists of a Display Module with filter and a keyboard. The Display Module provides capability to attach to the 4700 System Controller via a DCA connection and offers improved performance for administrative applications. (Additional information under "Special Features".)

**Model 1, 2 and 3:** A magnetics device and a PIN keypad (see "Accessories") may be optionally attached to the Display Control Module (mdl 1) or the Display Module (mdl 2 and 3).

The characters are well defined. Brightness and contrast are adjustable.

Automatic initiation of diagnostics begins when station is powered on.

Four different keyboards are available to meet various user and application requirements (see "Special Features").

Additional standard display station functions include:

- Upper- and lowercase characters
- Normal- and high-intensity
- MSR, MSR/E and PIN Keypad attachment capability
- Audible alarm
- 3604 Compatibility
- Banking Loop communication (mdl 1)

- Address sharing with printers (mdl 1)
- 3278-2 Compatibility (except magnetics) (mdl 2 and 3 only)
- DCA Communication (mdl 2 and 3 only)

Risers on the mdl 1 and 2 displays, and a pedestal on the mdl 3 that attach to the bottom of the Displays and keyboard, tilt the front of the display, or the rear of the keyboard, upward approximately 15 degrees. An optional cradle (mdl 1 and 2 only) enables the operator to adjust the viewing angle of the display from (-5 degrees to +20 degrees). A choice of anti-glare filters protect against light reflection. The anti-glare filters provide either yellow characters displayed on a brown background or bright green characters on a dark green background (see "Accessories"). One filter is provided with (and must be specified) for each display station.

**Customer Setup (CSU):** The 4704 is designated customer setup, thereby offering the customer early availability and station relocation flexibility. One copy of the CSU Instructions is shipped with each 4704.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4704.
- Performing 4704 checkout in accordance with IBM-supplied procedures for initial installation or relocation.
- Physical setup, connection of cables in protected customer access areas including loop cables (mdl 1), DCA cables (mdl 2 and 3), cables that attach the Display Control Module to the Display Monitor (mdl 1), and cables that attach keyboards, magnetics and PIN keypads to the Display Control Module (mdl 1) or Display Module (mdl 2 and 3).
- Using problem determination procedures provided with the 4704 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to forwarding the failing unit to an IBM Service/Exchange Center, or calling IBM if on-site exchange service is required. (See "Maintenance" below.)
- Determining any required spares.

**Display Monitors:** (Mdl 1) The Display Monitors are free-standing units which are cable attached to the Display Control Module. One Display Monitor must be selected for each Display Control Module. Only one Display Monitor may be attached to a 4704 Display Control Module. For spares, any number of Display Monitors may be ordered depending on user requirements.

**Display Modules:** (Mdl 2, 3) The Display Module is an integrated unit which contains a CRT plus the logic and power necessary to drive the CRT, keyboard and the optional magnetics and/or PIN keypad devices. One keyboard or keyboard combination must be selected for each Display Module. The Display Module will display, under program control, either 1,920 characters (24 lines of 80 characters each) or 480 characters (12 lines of 40 each). In the 480-character mode, the characters are larger than in the 1,920-character mode. Limitations: Not attachable to a 3600 System Controller. Customer Setup: Yes. Specify: One of the following must be selected for each Display Module: #9183 Anti-glare Filter (Green) or #9193 Anti-glare Filter (Amber) for mdl 2. #9184 Anti-glare Filter (Green) or #9194 Anti-glare Filter (Amber) for mdl 3.

**Keyboards:** The keyboards are packaged separately from the display, with a cable for attachment to the Display Control Module or Display Module. The Function, Expanded Alphanumeric and Administrative keyboards have a combination of pre-engraved and non-engraved keytops. These keyboards are provided with a set of keytop labels, some of which contain pre-printed numbers and the

remainder blank. The clear plastic cap which covers each non-engraved keytop protects the label from wear. One keyboard must be selected for each Display. Only one keyboard or keyboard combination may be attached to a 4704 Display Station. For spares, any number of keyboards may be ordered depending on user requirements.

**Publications:** For information on 4704 publications, refer to the "IBM 4700 Finance Communication System: Introduction to the IBM 4704 Model 2 and 3 Display Station" (GC31-2049).

## SPECIFY

Unless indicated otherwise, these specify features are not recommended for field installation.

- Power (AC, 1-phase): Specify #2998, then select one of the following:

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	120V #9911
220V #2813	
230V #2821	
240V #2801	

A line cord of 3m (9.8 ft) and the country-approved plug will be provided at the time of shipment.

- Plugs:

(Canada only> Specify #9890 for locking plug, #9891 for non-locking plug (for 60 Hz, 120V, 1-phase).<)

(Japan only> Specify #9890 for locking plug, #9891 for non-locking plug (for voltages under 200 Volts).<)

(Except Canada and Japan> The 3-digit Country Code of the Machine Order Sheet is used to select a power plug which matches the most commonly-used power supply in each country. If an exception to the above is required, a Country RPQ may be initiated.<)

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug will be shipped unless the Country RPQ referenced above is initiated.

- Cables: For DCA attachment, refer to "Accessories" section of M4701 pages for ordering information. The following cables are provided:

Model 1 - Attached to the Display Control Module are the cables for the Display Monitor attachment and the loop attachment.

Model 1 and 2 - The keyboards, magnetics, and PIN keypads provide a cable for attachment to the Display Control Module or Display Module. All cables are 2.0m (6.5 ft) long. For more information, see "IBM 4700 Finance Communication System: Installation Planning Manual", GC31-2018.

- Nomenclature:

Canadian French Bilingual	#2934
English	#2927
Japanese	#2930
Spanish	#2931

- Keyboard Language Groups: Specify one.

Canadian French	#2977
EBCDIC	#2951
International	#2950
Japanese English	#2955
Japanese Katakana	#2973
Spanish Speaking	#2969

UK  
US

#2958  
#2956

- Display Control Module or Display Module: Specify #9480 when ordering mdl 1 without Display Monitor or Keyboard, or mdl 2 or 3 without Keyboard.

## SPECIAL FEATURES

**Note:** When ordering special features via MES, the number of devices which may be on a single order is a maximum of 25.

**Display Monitor (5.5 in.) (#3255):** Mdl 1 displays up to 480 characters in 12 lines of 40 characters each on a 5.5-inch (diagonal) CRT. Limitations: Cannot be installed with #3290. Customer Setup: Yes. Specify: One of the following must be selected for each #3255 Display Monitor: #9181 Anti-glare filter (green) or #9191 Anti-glare filter (amber).

**Display Monitor (9 in.) (#3290):** Mdl 1 displays, under program control, either 1,920 characters (24 lines of 80 each) or 480 characters (12 lines of 40 each) on a 9-inch (diagonal) CRT. In the 480-character mode (default mode), the characters are larger than in the 1,920-character mode. Limitations: Cannot be installed with #3255. Customer Setup: Yes. Specify: One of the following must be selected for each #3290 Display Monitor: #9182 Anti-glare (green) or #9192 Anti-glare filter (amber).

**Administrative Keyboard (#4607):** A 107-Key keyboard with a permanently labeled typewriter layout of 62 keys plus a cluster of 10 control keys to the left of the alphameric block, a cluster of 15 keys to the right of the alphameric block and a cluster of 20 keys to the right of the 15-key cluster. Two of the keys in the 10-key cluster are permanently labeled; the remaining eight keys plus the entire 15- and 20-key clusters are programmable and may be labeled according to the application requirements. Limitations: (1) May not be combined with a Function Keyboard (#4650), an Alphameric Keyboard (#4662) or an Expanded Alphameric Keyboard (Except Canada and New Zealand> (#4677).<) (2) Attaches to 4704 mdl 2 and 3 and IBM Personal Computer and IBM Personal Computer XT with Financial Input Adapter (#6049) only. (Canada and New Zealand only> Attaches to 4704 mdl 2 and 3 and mdl 1 built after May, 1983 which indicate ROS EC level 01 or above.<) (3) This keyboard is not supported on 3600 System Controllers. Customer Setup: Yes.

**Function Keyboard (#4650):** A 50-key keyboard containing two clusters of 15 keys (a matrix of five rows, with three keys in each row) plus one cluster of 20 keys (a matrix of five rows, with four keys in each row) to the right side of the keyboard. 45 of these keys are non-engraved and may be personalized by the user according to requirements. The remaining five keys are pre-engraved. This keyboard may be combined with Alphameric Keyboard (#4662) for additional function. May be combined with Expanded Alphameric Keyboard (#4677) if attached to IBM Personal Computer or IBM Personal Computer XT with Financial Input Adapter. Limitations: May not be combined with Expanded Alphameric Keyboard (#4677) or Administrative Keyboard (#4607) on a 4704. Customer Setup: Yes.

**Alphameric Keyboard (#4662):** A 62-key alphameric keyboard. It provides a typewriter layout with permanently labeled keys. This keyboard may be combined with Function Keyboard (#4650) for additional function. Limitations: May not be combined with an Expanded Alphameric Keyboard (#4677) or Administrative Keyboard (#4607). Customer Setup: Yes.

**Expanded Alphameric Keyboard (#4677):** A 77-key Keyboard with a permanently labeled typewriter layout of 62 keys plus a cluster of 15 non-engraved function keys to the right of the alphameric block. The 15 function keys are programmable and can be labeled according to the application requirements. Limitations: May not be combined with a Function Keyboard on a 4704. May be combined with a Function Keyboard if attached to IBM Personal Computer or IBM Personal Computer XT with Financial Input Adapter (#6049). Customer Setup: Yes.

## MACHINES

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

The following items are available on a purchase-only basis. Order by feature number with original machine order for delivery of the item with the 4704. Order the item on Part Supplies Requisition for delivery at any other time.

**Filters:** Anti-glare filters will protect against light reflection and provide either a yellow character display on a brown background (amber) or bright green characters on a dark green background (green). (One filter is provided with each display station.) One filter must be selected for each display monitor feature (see "Special Features").

P/N	Filter Description
6019538	Green (5.5 in.) Mdl 1
6019539	Green (9.0 in.) Mdl 1
6019533	Amber (5.5 in.) Mdl 1
6019536	Amber (9.0 in.) Mdl 1
8583479	Green (9.0 in.) Mdl 2
8583480	Amber (9.0 in.) Mdl 2
8583444	Green (12.0 in.) Mdl 3
8583445	Amber (12.0 in.) Mdl 3

**Cradle:** A vertical tilt capability allows the display operator to adjust the display monitor from -5 to plus 20 degrees, (mdls 1 and 2 only). The cradle may be set on a counter top or for mdl 1 only may be mounted to the underside of a horizontal surface. A bracket supplied for hanging the cradle provides a swivel capability.

P/N	Description
6019529	Cradle (5.5 in.)
6019530	Cradle (9.0 in.)

**Magnetic Stripe Reader:** Specify #4904 for delivery of the unit with the 4704. Order P/N 6096847 for delivery of the unit any other time. Has read capability only. The MSR is capable of reading the contents of ANSI Track 2 (75 bpi) on a credit or other plastic card.

**Limitations:** Cannot be installed with Magnetic Stripe Reader/Encoder. Maximum: One.

**Magnetic Stripe Reader:** Specify #4901 for delivery of the unit with the 4704. Order P/N 6019489 for delivery of the unit at any other time. The MSR is capable of reading both the contents of ANSI or ISO Track 2 (75 bpi) on a credit or other plastic card and the contents of a track encoded on a magnetic striped savings book by a 4704 or 3604 magnetic stripe encoder (210 bpi). When attached to a 4704 mdl 1, the MSR is also capable of reading the contents of a track encoded at 210 bpi in accordance with JUCC specifications. The slot in the device is designed to accept documents ranging in thickness from 0.25mm (0.010 in.) to 2.44mm (0.096 in.).

**Limitations:** Cannot be installed with Magnetic Stripe Reader/Encoder. Maximum: One.

**Magnetic Stripe Reader/Encoder:** Specify #4905 (P/N 6096846) for delivery of the unit with the 4704 --- P/N 6096846 for delivery of the unit any other time. Has read and encode capability. The device is capable of reading the contents of Track 2 on a credit card (encoded at 75 bpi according to the ANSI Standard X4.16) or an ID card or passbook encoded at 210 bpi on another magnetic stripe encoder attached to a 4704 or 3604, or equivalent. When attached to a 4704 mdl 1, the Magnetic Stripe Reader/Encoder is also capable of reading the contents of a track encoded at 210 bpi in accordance with JUCC specifications. The device encodes at 210 bpi in the 3604 Passbook Format. The slot in the device is designed to accept documents ranging in thickness from 0.25mm (0.010") (excluding magnetic stripe), to 0.96mm (0.038") (including magnetic stripe). It will accept plastic credit cards and ID cards or one cover of a magnetically encoded passbook. **Limitations:** Cannot be installed with Magnetic Stripe Reader. Maximum: One. Customer Responsibility:

The customer must be advised that: The customer is responsible for obtaining the appropriate number of spare magnetic stripe devices --- the customer is responsible for determining the failing unit.

**Warranty:** Magnetic stripe readers and reader/encoders are not maintained by IBM under the normal lease agreement or MMMC for purchased machines.

**Cleaning Card (P/N 6019483):** A card which is used for cleaning the magnetic head on a Magnetic Stripe Reader.

**Encrypting PIN Keypad:** A cable attached encrypting PIN keypad device enabling the customer to enter a personal identification number that becomes encrypted during a transaction. **Limitations:** Cannot be installed with a Non-Encrypting PIN Keypad. Maximum: One.

P/N	Description
5667650	English
5680930	Latin American Spanish
5680918	Canadian French
5680944	Japanese

**Non-Encrypting PIN Keypad:** A cable attached non-encrypting PIN keypad device enabling the customer to enter a personal identification number during a transaction.

P/N	Description
5680905	English
5680923	Latin America Spanish
5680932	Canadian French
5680935	Japanese

**PIN Keypad Privacy Shield:** Provides a degree of visual shielding while allowing easy manipulation of the PIN keypad keys.

P/N	Description
4707195	Shield

**Keypad Protective Caps:** Clear plastic caps which cover non-engraved keytops to protect the label from wear.

P/N	Description
4585103	Keypad Cap

**Keypad Label Sheets:** Labels which provide the user with some pre-printed numbers and/or blanks for users requirements.

P/N	Description
8248324	Blank Labels
8248318	Labels Pre-printed with numbers
8248319	Labels Pre-printed with function keys

Fuses:	
512137	(5A Slow Blow) -(100-120V, 50/60 Hz)
5718367	(3A Slow Blow) -(200-240V, 50 Hz)

Document Holder: P/N 4732870

### SUPPLIES

Refer to the NDD-SS sales manual for Magnetic Cards and Magnetic Stripe Labels.



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MACHINES

M 4706.1

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## IBM 4706 DOCUMENT CODELINE AND MAGNETIC STRIPE READER

### PURPOSE

A slot reader for 4704 Display Stations and the 4700 Personal Computer that optically reads the encoding line on checks and other documents and magnetically reads an encoded stripe on a plastic card or passbook.

The 4706 is comprised of two units. One unit is the slot reader, which would be located on a countertop or desk. A separate power unit is designed to be placed off the work area to conserve space.

### MODELS

Model 1 001 The Model 1 is capable of reading the contents of ANSI or ISO track 2 (75 bpi) and the contents of track 2 encoded at 210 bpi.

**Prerequisites:** An available magnetics port on a 4704 or a 4700 Personal Computer and an available electrical outlet. The power unit connects to the port via its integral cable and to the electrical outlet via its linecord. The slot reader connects to the power unit via its integral cable.

**Customer Setup (CSU):** The 4706 is designated customer setup, thereby offering the customer early availability and relocation flexibility. A copy of the manual, IBM 4706 Setup and Operating Instructions (GC31-2585), is shipped with each 4706.

### HIGHLIGHTS

- Eliminates the need for operator keying of data that is contained in the encoding line of a document or the magnetic stripe of a plastic card or passbook. After the document or card is read, the operator completes the transaction by keying any other required fields. The entire transaction is thus captured electronically as a by-product of document handling.
- Attaches to all models of the 4704 display station and the 4700 Personal Computer via the magnetics port.
- Optically reads the encoding line on checks or other documents encoded in E13B, OCR-A, OCR-B, or CMC-7 with automatic font determination.
- The OCR head is capable of reading a mixed font encoded line which begins in OCR-B font and switches to E13B font when the special font switch character is encountered.
- Capable of reading the contents of ANSI or ISO track 2 (75 bpi) and the contents of track 2 encoded at 210 bpi.
- When attached to a 4704 mdl 1, the 4706 is capable of reading the contents of track 2 encoded at 210 bpi in accordance with JUCC specifications.
- Separate power unit requires no space at the workstation. It is equipped with a bracket for mounting the unit on a vertical surface underneath the countertop or desk.
- Small footprint of the reader requires minimal space at the workstation. The operator can also position the device for optimum comfort and convenience.
- Device status is easily determined by three indicator lights: ready, processing and rescan.

### Customer Responsibilities:

Customers must be advised that their responsibilities include:

Assuring that the use of the equipment complies with all national, regional and local laws, regulations and ordinances.

Adequate site, system and other vendor preparation.

Determining any required spares.

Receipt at the customer's receiving dock, unpacking and placement of the 4706.

Performing 4706 checkout in accordance with IBM-supplied procedures and for initial installation or relocation.

Physical setup and connection of cables in protected customer access areas. This includes the cable that attaches the slot reader to its power unit and the cable that attaches the power unit to the magnetics port of its host 4704 or 4700 Personal Computer.

Using problem determination procedures provided with the 4706 to determine the failing unit and filling out the appropriate 4700 Problem

Report prior to forwarding the failing unit to an IBM designated location.

### MAINTENANCE AND WARRANTY SERVICES

**Warranty Service:** The warranty period is one year following the date of installation.

Maintenance is provided during the warranty period as described in the Customer Carry-In Repair option of the IBM Service/Exchange Center's Maintenance plan, except when a Warranty Option plan is in effect. (See the machines "Terms and Conditions" section of the sales manual for description of the warranty options.)

**Note:** Not all Warranty Option plans are available in each country. Contact the country Service Department for available options and applicable terms and conditions in your country.

**Maintenance Services:** The 4706 utilizes IBM Service/Exchange Centers under the following options:

- Customer Carry-In Exchange (CCE)
- Customer Carry-In Repair (CCR)

See GI section, CE services subsection, for description and procedures associated with service centers.

### SPECIFY

Unless indicated otherwise, the following specify codes are available only at time of manufacture.

(Except Canada and Japan+)

- Power: Specify #2998, then select one of the following:

50 Hz

100V to 110V #9893

200V to 240V #9894

60 Hz

100V to 120V #9892

- Power Plugs: The three-digit WT country code of the ISG Machine Order Sheet is used to select a power plug that matches the most commonly used power supply in each country. If an exception to the above is required, a Country RPQ may be initiated.

- Power Plugs and Line Cords: If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug is shipped unless the Country RPQ referenced above is initiated. +)

(Canada and Japan only+)

- Power (120V AC, 60 Hz): Specify #2998 only.

- Power Plugs: Specify #9890 for a locking plug. If not specified, the order will default to a nonlocking plug. +)

- Machine Nomenclature:

Canadian-French

Bilingual #2934

English #2927

Japanese #2930

Spanish #2931

### SPECIAL FEATURES (None)

### MODEL CONVERSIONS (None)

### ACCESSORIES (None)

### SUPPLIES (None)

## 4708 DISK UNIT

### PURPOSE

Provides disk storage for the 4701 Model 3 (Model 5 only) Finance Communication Controller and the 4702 Branch Automation Processor (Models 5 and 6).

### MODELS

**Model 1 001:** (NO LONGER AVAILABLE) A disk unit with one disk drive having a formatted capacity of 72M-bytes.

**Model 2 002:** (NO LONGER AVAILABLE) A disk unit with two disk drives having formatted capacities of 72M-bytes each.

**Model 3 003:** (NO LONGER AVAILABLE) A disk unit with one disk drive having a formatted capacity of 30M-bytes.

**Model 4 004:** (NO LONGER AVAILABLE) A disk unit with two disk drives having formatted capacities of 30M-bytes and 72M-bytes.

**Model 5 005:** A disk unit with two drives having formatted capacities of 44M-bytes each.

**Model 6 006:** A disk unit with two drives having formatted capacities of 44M-bytes each. (Provides the attachment capability for one 4708 Disk Unit Model 5.)

**Streaming Tape Attachment Features:** Attaches the Streaming Tape Drive (#6157) to the 4708 Disk Unit. The Streaming Tape Attachment Features when used with the Streaming Tape Drive provide high speed save/restore capability for 44 MB 5-1/4 inch hard files in the 4708 Disk Unit Model 5. These Features are field installable. (See Non-Communications Features section)

**Customer Setup (CSU):** The 4708 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, refer to the GI section. One copy of the CSU Instructions is shipped with each 4708. The diagnostics are included on the diagnostic diskette shipped with the 4701 model 3 or the 4702.

### HIGHLIGHTS

The 4708 Disk Unit provides disk storage for the 4700 Finance Communication System. The 4708 attaches to the 4701 Model 3 (Model 5 only) Controller and the 4702 Branch Automation Processor via a Disk Unit Adapter feature (Models 5 and 6).

Disk Storage for the 4708 is provided by 5.25-inch high density non-removable disk drives. Models 5 and 6 of the 4708 provide two 44M-byte Disk Drives each.

**Streaming Tape Attachment Features:** Attaches the Streaming Tape Drive (#6157) to the 4708 Disk Unit. The Streaming Tape Attachment Features when used with the Streaming Tape Drive provides high speed save/restore capability for the 44MB 5-1/4 inch hard files in the 4708 Disk Unit Model 5. It is recommended that streaming tape operations (Save/Restore) be done during non-operational periods because of the following:

1. A disk being saved/restored to/from a streaming tape, CAN NOT BE USED by any application program for the duration of the streaming operation.
2. References to other DASD devices will take significantly longer than normal during a streaming operation. See related product documentation for details.

(See Non-Communications Features section.)

**Customer Responsibilities:** All customers must be advised that their responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
- Receipt at the customer's receiving dock, unpacking and set-up of the unit.
- Performing 4708 checkout in accordance with supplied procedures for initial installation or relocation, and updating of processor diskettes (at customer option).
- Physical setup and connection of cables in protected customer access areas including cables for the Disk Unit.
- Security for erasure of data from a failing disk unit being serviced by IBM. It is IBM's practice to erase any remaining data on a replaced disk before reusing it.
- Using the problem determination procedures provided with the 4708 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to requesting IBM service (see "Maintenance" below). If IBM service is requested, the 4708 must be attached to a 4701 mdl 3 or 4702.
- Determining the need for any required spares.
- Notifying IBM of intent to relocate the 4708 and following IBM instructions regarding relocation.

**Publications:** For information on 4700 publications, refer to the "4700 System Summary" (GC31-2016).

**Controller or Processor Attachment:** 4701 mdl 3 Controller: Attachment of all model 5(s) is provided via #3704 Disk Unit Adapter feature for one unit or #3705 Disk Unit Adapter for two units. Specify #9652 must be ordered for each second unit.

**4702 Branch Automation Processor:** Attachment of Model 5 is provided via the #3703 Disk Unit Adapter feature. When two 4708s are required, model 6 will attach to the 4702 and model 5 will attach to model 6. Specify #9653 must be ordered for each 4708 attaching to the 4702.

4702 Attachment: If 4708-005 is attached to 4702, specify #9653 to assure proper file addressing.

**Maintenance:** IBM on-site Repair warranty service is included in the purchase price of the machine and is provided under the Agreement for the Purchase of IBM Machines.

Maintenance service is available under the IBM Maintenance Agreement (Z125-3275). Only on-site repair is offered for this machine. IBM Hourly Service is available at the customer site.

It is the customer's responsibility to set up the equipment and to determine when maintenance is required.

### SPECIFY

Unless indicated otherwise, these specify features are only available at time of manufacture.

**Second 4708 Disk Unit:** Specify #9652 when the 4708 is used as the second unit. Feature #3705 must be ordered for the 4701 Model 3 Controller.

- Voltage: Specify #2998. Specify codes may not be required when ordering a 4708. If no code is specified, the appropriate default will be assumed based on the three-digit country code. Default countries are shown below:

## MACHINES

Argentina	Chile	Sri Lanka
Australia	New Zealand	Uruguay

All of the above will be shipped with 220/240V AC, 50 Hz.

Brazil	Japan	South Korea
Canada	Mexico	Taiwan
Domin Repub	Peru	Venezuela
Ecuador	Philippines	

All of the above will be shipped with 50/60 Hz, 120V.

For countries not listed above, specify:

50 Hz	60 Hz
100V to 110V #9893	100V to 120V #9892
200V to 240V #9894	

(Canada Only) Specify #9890 for locking plug. If not specified, a non-locking plug will be provided (for 60 Hz, 120V, 1-phase). (<)

(Japan Only) Specify #9890 for locking plug. If not specified, a non-locking plug will be provided (for voltages under 200V). (<)

(Except Canada and Japan) The three-digit WT country code of the DP Machine Order Sheet is used to select a power plug which matches the most commonly-used power supply in each country. If an AC power source other than the most common in the country is specified, and it is incompatible with the power plug commonly supplied, no power cord will be shipped unless a country RPQ is initiated. (<)

- A line cord of 3.0m (9.8 ft) and the country approved plug will be provided at the time of shipment.
- Machine Nomenclature: The machines will be shipped to countries with the following nomenclature defaults:

Argentina	Spanish
Australia	English
Brazil	Portuguese
Canada	Canadian/French
Chile	Spanish
Domin Republic	Spanish
Ecuador	Spanish
Japan	Japanese

Mexico	Spanish
New Zealand	English
Peru	Spanish
Philippines	English
South Korea	English
Sri Lanka	English
Taiwan	English
Uruguay	Spanish
Venezuela	Spanish

If exceptions are required or if none is listed for your country, specify from the following list:

English	#2927	Portuguese	#2933
Canadian/French		Spanish	#2931
Bilingual	#2934		

## SPECIAL FEATURES

### Non-Communication Features

**Note:** Unless otherwise stated, all features available for Field Installation requires service personnel.

**6157 Attachment Feature (#3733):** Provides the attachment feature in the 4708 Disk Unit. Maximum: One. Limitations: Model 5 or Model 6 only. Field Installation: These features are field installable via RPQs.

**6157 Attachment Feature and Switch Function (#3734):** Provides the attachment feature and switch function in a 4708 Disk Unit to attach the 6157 to a 4702 Processor and 4708 Disk Unit or attach a 6157 to dual 4708s. Maximum: One. Limitations: Model 5 or Model 6 only. Field Installation: These features are field installable via RPQs.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 4710 FINANCE COMMUNICATION SYSTEM RECEIPT/VALIDATION PRINTER

### PURPOSE

The 4710 receipt/validation printer is a table top printer designed to fit into a teller workstation along with other teller operated key-boards and displays. The 4710 attaches to a controller via a loop, which operates at speeds of 1200, 2400 or 4800 bps. The 4710 attaches to the Personal Computer and the Personal Computer XT via the 4700/PC Financial Output Adapter Option. (See M5150 or 5160 pages for further information.)

### MODELS

**Model 001:** Provides for banking receipt, validation and journal functions. Has a 96-character set (Japan only) or 128-character set (Katakana) and prints at 10 or 12 characters per inch.

**Model 002:** Provides for banking receipt and validation printing without the journal. Has a 96-character set (Japan only) or 128-character set (Katakana) and prints at 10 or 12 characters per inch.

**Prerequisites:** Model 1, an available position on a loop of a 4700 or 3600 Finance Communication System. Model 2, an available position on a loop of a 4700 Finance Communication System.

**Programming Support:** Programs previously developed for the 4710 model 1 can be utilized on the 4710 model 2 without changes, provided those programs support the 4710 model 1 as a cut-form printer only.

**Customer Setup (CSU):** The 4710 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU, refer to the GI section of the Sales Manual. One copy of the CSU Instructions is shipped with each 4710. The CSU allowance is four days.

### HIGHLIGHTS

The 4710 printer prints on a variety of forms and paper stock to provide for banking receipt, validation and (on the model 1) journal functions. It prints on single, double or triple part forms such as checks, receipts and validation documents. Documents are inserted vertically and do not require edge justification. Forms can easily be inserted/positioned with one hand to a fixed bottom registration point.

Printing operations are initiated manually via either of two separate keys if shared, or automatically upon sensing an inserted document. Either option can be selected under application program control.

Ribbon replacement is a "clean hands" operation.

Printing is bidirectional with a maximum of 120 characters per second at 12 cpi, and a maximum of 100 characters per second at 10 cpi, selectable by Application program. The 4710 printer can print from one to four lines per document. BOLD printing (2 x normal character width) is standard, selectable by application program.

Sixteen customer-designable characters can be added to the character set.

Shared Workstations is included. (Station A/B Start Keys.)

Address sharing is supported. Like and Unlike devices. (Printer with Printer and Printer with Display.)

For mdl 1, a Locked Journal Roll function is standard. One- or two-part paper rolls may be used.

Single part rolls may be 25.4m (100 ft) in length.  
 Two part rolls may be 12.7m (50 ft) in length.  
 A tear bar is provided for the exiting paper.

A slot is provided to permit manually writing on the journal.

The Journal Print Station is located directly behind the Document Print Station, thus allowing the same lines which print on the cut form document to print on the journal roll.

### Indicator Lights:

- Ready: Indicates status of loop communications.
- Check: Indicates a machine check.
- Insert Form: Signals operator to insert form; when extinguished, verifies form accepted. Controlled by application program.
- Programmable Indicators: For mdl 1 there are two, mdl 2 has three. Controlled by application program.
- Journal Paper Out: (Model 1 only) Paper nearing end.

**Operator Control Keys:** Four control keys are provided on the mdl 1. Three control keys are provided on the mdl 2.

- Start Keys (2)
- Stop Key
- Journal Advance Key (Model 1 only)

**Forms Specifications:** Refer to "Forms Design Reference Guide for Printers", GA24-3488.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional, and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4710.
- Replacement of ribbon and paper on the mdl 1. (See "Supplies" below.)
- Performing 4710 checkout in accordance with supplied procedures for initial installation or relocation.
- Physical setup, connection of cables in protected customer access areas including loop cables.
- Using the problem determination procedures provided with the 4710 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to forwarding the failing unit to an IBM Service/Exchange Center, or calling IBM if on-site exchange service is required. (See "Maintenance" below)
- Determining any required spares.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.

**Maintenance:** The following services are available for an annual charge:

- IBM On-Site Exchange (IOE)
- Customer On-Site Exchange (COE)
- Customer Carry-In Exchange (CCE)
- Customer Carry-In Repair (CCR)

**IBM On-Site Exchange:** This service allows the customer to call the customer service branch office, after the customer has performed CPAR. An IBM representative will bring a replacement unit to the customer site, set-up and test the replacement unit; and remove the defective unit. The defective unit becomes the property of IBM.

**Customer On-Site Exchange:** This service allows the customer to call the customer service branch office, after the customer has performed CPAR. IBM will arrange for delivery of a replacement unit

to the site specified by the customer using various delivery methods. The customer is responsible for set-up and testing of the replacement unit using CSU procedures. The customer returns the defective unit to IBM as instructed by IBM. The delivery transportation charge to and from the customer site is paid by IBM. The defective unit becomes the property of IBM.

**Customer Carry-In Exchange:** To use this service, after isolating a defective unit using CPAR procedures, the customer calls the customer service branch office and transports the defective unit to a designated IBM Service/Exchange Center (S/EC). IBM will provide an equivalent, functioning unit on an exchange basis. The customer is responsible for delivery charges to and from the S/EC. The customer is responsible for set-up and testing of the replacement unit using CSU procedures. The defective unit becomes the property of IBM.

**Customer Carry-In Repair:** To use this service, after isolating a defective unit using CPAR procedures, the customer transports the defective unit to the designated IBM S/EC. The IBM S/EC will ship the defective unit to an IBM Repair Center where it will be repaired and returned to the S/EC to await customer pick-up. (The customer may ship (prepaid) a defective unit directly to a designated Repair Center in its original shipping container or equivalent. IBM will return the repaired unit prepaid.) The customer is responsible for set-up and testing of the repaired unit using CSU procedures.

**Hourly Service:** Hourly service may be obtained by calling the IBM toll-free number. The customer will then be given instructions for delivering the machine to IBM for such service.

**Warranty Service:** The warranty period is three months following the date of installation.

**Note:** Customer Carry-In Exchange service is provided for all warranty coverage except when a Warranty Option plan is in effect.

Not all Warranty Option plans are available in each country. Contact the country Service Department for available options and applicable terms and conditions in your country.

**Warranty Option:** This plan is intended for customers who desire a more convenient service coverage for the three month warranty period and for the nine months following the warranty period.

The Warranty Option plan may be selected at the time of order by using Feature Codes 9799 or 9826. The selected plan will supersede the basic CCE service during the warranty period and will continue for nine months following that period.

If a Warranty Option plan is ordered from the Service Branch Office after installation and during the three month warranty period, the plan will supersede the basic CCR service for the remainder of the three month period and will continue for nine months after that period. Implementation of a Warranty Option plan during the three month warranty period does not extend that period.

Warranty Option plans available:

Warranty Option plan IOE -- Feature Code 9799

Warranty Option plan COE -- Feature Code 9826

If IBM maintenance coverage is not contracted to begin immediately following expiration of any service and parts warranty and the customer subsequently wants IBM maintenance coverage, the machine(s) must be certified by the customer as begin in good working order prior to placing them on IBM maintenance. If the customer does not certify the machine(s) then they must be inspected to determine whether or not the machine(s) still qualifies for IBM maintenance. The customer must ship the machine(s) to a designated IBM Repair Center or Service/Exchange Center. A minimum charge to cover handling, inspection, cleaning, testing and return shipping charges will be applied. In addition, if the unit requires repair and repair is requested, all parts needed are billed at the prevailing IBM parts prices and the additional time required for the repair is billed at the applicable IBM service rates. The machine then becomes eligible for IBM maintenance coverage.

If on the basis of the inspection, IBM concludes that the machine is not repairable, no further work will be performed and the machine will be returned to the customer subject to the minimum charges.

**Publications:** For information on Publications about the 4710, refer to the "IBM 4700 Finance Communication System: Summary", GC31-2016.

**Cables:** For information on loop cabling, refer to 'Accessories' in the M4701 pages.

## SPECIFY

Unless indicated otherwise, the following specify and order codes are only available at time of manufacture.

- **Voltage:** Specify #2998. Then select one of the following:

50 Hz	60 Hz
100V to 110V #9893	100 to 120V #9892
200V to 240V #9894	

- (Canada and Japan only) Voltage: 120V AC, - 60 Hz; Specify #2998 only.

- **Plugs/Linecord:** Locking plug: Specify #9890 If not specified, order will default to a nonlocking plug. <)

(Except Canada) The 3-digit WT Country of the ISG Machine Order Sheet is used to select a power plug which matches the most commonly-used power supply in each country. If an exception to the above is required, a Country RPQ may be initiated. <)

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug is shipped unless the Country RPQ referenced above is initiated.

- **Machine Nomenclature:**

Canadian/French Bilingual	#2934
English	#2927
Japan	#2930
Portuguese	#2933
Spanish	#2931

Field installation not recommended.

- **Printer Character Set Groups:** (Japan only: Katakana (#2973) 128-character set). Unique characters of other WT Character Sets are loaded into the terminal at time of CPGEN. They do not have to be specified at time of order.

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Locks and Keys:** The 4710 is shipped with two identical keys for the cover lock. Additional keys may be purchased from IBM. Order via MES from plant of manufacture. Indicate serial number of lock.

## SUPPLIES

The following items, available from the National Distribution Division (NDD), or their equivalents, are required.

**MACHINES**

**Paper (Model 1 only)**

100-ft single journal roll action paper:

Carton of 48 rolls 4.5 in. wide, P/N 7032894  
One roll 4.5 inches wide, P/N 7032895

50-foot two-part journal roll action paper:

Carton of 48 rolls 4.5 inches wide, P/N 7032919  
One roll 4.5 inches wide; P/N 7032920

**Ribbon**

Black Ribbon, one box; P/N 7037985  
Purple Ribbon, one box; P/N 7033537

One ribbon is provided with each printer.

## 4715 CONTINUOUS FORMS PRINTER

### PURPOSE

The 4715 is a table-top, serial, bidirectional, wire matrix, impact printer. It is a multi-function printer capable of high speeds and quality printing of alphanumeric characters and symbols on continuous forms or cut forms. The 4715 provides appropriate printing capabilities for a variety of administrative functions. The 4715 attaches to a 4701 Controller via a B loop. The 4715 attaches to the Personal Computer and the Personal Computer XT via the 4700/PC Financial Output Adapter Option. (See M5150 or 5160 pages for further information.)

### MODELS

#### Model 1 001

**Prerequisites:** An available position on a loop of a 4701 Controller.

**Customer Setup (CSU):** The 4715 is designated a customer setup machine, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU refer to the GI section. One copy of the CSU Instructions is shipped with each 4715. The CSU allowance is four days.

### HIGHLIGHTS

- Attaches to the 4701 Controller via a loop that operates at speeds of 1200, 2400, or 4800bps.
- Prints on continuous forms paper from 114.3 to 254mm (4.5 to 10.0 in.) wide (edge-to-edge).
- Prints on cut forms with multiple parts up to 0.28mm (0.011 in.) in total thickness.
- Accepts cut forms from 98.04mm (3.86 in.) up to a maximum of 254mm (10 in.) in width, and 127mm (5.0 in.) up to a maximum of 457mm (18.0 in.) in length.
- Clean hands ribbon replacement.
- Small footprint 469.9mm (18.5 in.) in width by 411mm (16.18 in.) in depth by 148mm (5.89 in.) in height without the forms feed tractor. 106mm (4.0 in.) higher with tractor.
- Supports both regular and quality print.
- Bidirectional printing at:

Characters per Inch	Characters per Second	Type of Print
10	180	Regular
10	90	Quality
12	216	Regular
12	108	Quality
17	154	Regular

All program selectable.

- Has an 8-inch print line and capable of printing up to 136 characters on a line at 17 characters per inch.
- Line spacing of five or six lines per inch. Program selectable.
- Incremental line spacing available 1/120 inch per step.
- Bold printing capability is standard.
- Continuous underline feature.
- An 18-wire print head that is customer-replaceable.

- Removable tractor feed.
- 212-character set, 16 customer-definable characters.
- Supports address sharing on like and unlike devices (printer-with-printer and printer-with-display).
- Nine indicator lights.
- Five control keys.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4715.
- Providing paper.
- Replacement of ribbon.
- Performing 4715 checkout in accordance with supplied procedures for initial installation or relocation.
- Physical setup, connection of cables in protected customer access areas including loop cables.
- Using the problem determination procedures provided with the 4715 to determine the failing unit and for filling out the appropriate 4700 Problem Report prior to forwarding the failing unit if an IBM Service/Exchange Center, or calling IBM if on-site exchange service is required. See "Maintenance" below.
- Replacing worn or defective print heads and maintaining a supply of spare print heads.
- Determining any required spares.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.

### MAINTENANCE

The following services are available for an annual charge:

IBM On-Site Exchange (IOE)  
Customer On-Site Exchange (COE)  
Customer Carry-In Exchange (CCE)  
Customer Carry-In Repair (CCR)

**IBM On-Site Exchange:** This service allows the customer to call the customer service branch office after the customer has performed CPAR. An IBM representative will bring a replacement unit to the customer site, install the customer's print head, set-up and test the replacement unit; and remove the defective unit. The defective unit becomes the property of IBM.

**Customer On-Site Exchange:** This service allows the customer to call the customer service branch office after the customer has performed CPAR. IBM will arrange for delivery of a replacement unit to the site specified by the customer using various delivery methods. The customer is responsible for installing a print head and set-up and testing of the replacement unit using CSU procedures. The customer returns the defective unit to IBM as instructed by IBM. The delivery transportation charge to and from the customer site is paid by IBM. The defective unit becomes the property of IBM.

**Customer Carry-In Exchange:** To use this service, after isolating a defective unit using CPAR procedures, the customer calls the customer service branch office and transports the defective unit to a designated IBM Service/Exchange Center (S/EC). IBM will provide

an equivalent, functioning unit on an exchange basis. The customer should remove and retain the print head from the defective unit. The customer is responsible for delivery charges to and from the S/EC and is also responsible for set-up and testing of the replacement unit using CSU procedures. The defective unit becomes the property of IBM.

**Customer Carry-In Repair:** To use this service, after isolating a defective unit using CPAR procedures, the customer transports the defective unit to the designated IBM S/EC. The IBM S/EC will ship the defective unit to an IBM Repair Center where it will be repaired and returned to the S/EC to await customer pick-up. (The customer may ship (prepaid) a defective unit directly to a designated Repair Center in its original shipping container or equivalent. IBM will return the repaired unit prepaid.) The customer is responsible to set-up and test the repaired unit using CSU procedures.

**Hourly Service:** Hourly service may be obtained by calling the IBM toll-free number. The customer will then be given instructions for delivering the machine to IBM for such service.

**Warranty Service:** The warranty period is 3 months following the date of installation.

**Customer Carry-In Exchange Service** is provided for all warranty coverage except when a Warranty Option Plan is in effect.

Not all Warranty Option plans are available in each country. Contact the country Service Department for available options and applicable terms and conditions in your country.

**Warranty Option:** This plan is intended for customers who desire a more convenient service coverage for the 3 month warranty period and for the 9 months following the warranty period.

The Warranty Option plan may be selected at the time of order by using Feature Codes #9799 and #9826. The selected plan will supersede the basic CCR service during the warranty period and will continue for 9 months following that period.

If a Warranty Option plan is ordered from the Service Branch Office after installation and during the 3 month warranty period, the plan will supersede the basic CCE service for the remainder of the 3 month period and will continue for 9 months after that period. Implementation of a Warranty Option plan during the 3 month warranty period does not extend that period.

Warranty Option plans available:

Warranty Option plan IOE - Feature Code #9799  
Warranty Option plan COE - Feature Code #9826

If IBM maintenance coverage is not contracted to begin immediately following expiration of any service and parts warranty and the customer subsequently wants IBM maintenance coverage, the machine(s) must be certified by the customer as being in good working order prior to their being placed on IBM maintenance. If not certified the machine(s) must be inspected to determine whether or not the machine(s) still qualifies for IBM maintenance. The customer must ship the machine(s) to a designated IBM Repair Center or Service/Exchange Center. A minimum charge to cover handling, inspection, cleaning, testing and return shipping charges will be applied. In addition, if the unit requires repair and repair is requested, all parts needed are billed at the prevailing IBM parts prices and the additional time required for the repair is billed at the applicable IBM service rates. The machine then becomes eligible for IBM maintenance coverage.

If on the basis of the inspection, IBM concludes that the machine is not repairable, no further work will be performed and the machine will be returned to the customer subject to the minimum charges.

**Marketing Information:** IBM Credit Corporation Financing. The 4715 is available for Term Lease. Refer to HONE LEASCALC for specific lease options, terms, and rates.

**Forms Specification:** Refer to "IBM Planning and Operations Manual", (GC31-2536).

**Publications:** The following publications will be available from Mechanicsburg on or after May 15, 1984: "IBM 4715 Planning and Operations Manual", (GC31-2536) -- "IBM 4715 Setup Instructions", (GC31-2535) -- "IBM 4715 Repair Manual", (SC31-3538).

## SPECIFY

Unless indicated otherwise, the following specify and order codes are only available at time of manufacture.

- Power: Specify #2998 then select one of the following:

50 Hz	60 Hz
100V to 110V #9893	100V to 120V #9892
200V to 240V #9894	

- (Canada only > Power (120V AC, 60 Hz): Specify #2998 only. <)
- (Canada only > Power Plugs: Specify #9890 for a locking plug. If not specified order will default to a nonlocking plug. <)
- (Except Canada > Power Plugs: The three digit WT country of the ISG Machine Order Sheet is used to select a power plug that matches the most commonly-used power supply in each country. If an exception to the above is required, a Country RPQ may be initiated. <)
- Power Plugs and Line Cords: If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug is shipped unless the Country RPQ referenced above is initiated.
- Machine Nomenclature:

Canadian-French	Portuguese	#2933
Bilingual	Spanish	#2931
English		#2927

## SPECIAL FEATURES (NONE)

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Forms Stand:** Permits feeding of continuous forms from the carton and provides for stacking after printing. For shipment with the machine, order by device code #4450. For field installation order via MES using P/N 2243650.

## SUPPLIES

The following items are available from IBM.

**Ribbons:** Black ribbon P/N 6097704. One ribbon is supplied with the printer.

**Print Head, Customer-Replaceable (P/N 6097705):** One print head is supplied with the printer. The print head is a consumable item, and to assure maximum availability, it is recommended that the customer have at least one spare print head for every four units.

## 4720 - FINANCE COMMUNICATION SYSTEM

### FORMS/PASSBOOK PRINTER

#### PURPOSE

The 4720 forms/passbook printer is a family of table-top printers designed to fit into a teller or administrative workstation along with other 4700 devices. The 4720 printer is available in a series of models intended to provide appropriate printing capabilities for a variety of financial applications. The 4720 printers attach to 4701 controllers via a loop. Attachment to 3600 controllers is supported by PRPQ 5799-BJE. The 4720 attaches to the Personal Computer and the Personal Computer XT via the 4700/PC Financial Output Adapter Option. (See M5150 or 5160 pages for further information.)

#### MODELS

**Model 1 001:** Provides cutform printing capability.

**Model 2 002:** Provides cutform and journal printing capability.

**Model 3 003:** Provides cutform and passbook printing capability.

**Model 4 004:** Provides cutform, passbook, and journal printing capability.

**Prerequisites:** An available position on a loop of a 4701 Finance Communication System Controller.

**Customer Setup (CSU):** The 4720 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. One copy of the CSU Instructions is shipped with each 4720. The CSU allowance is four days.

#### HIGHLIGHTS

The 4720 printer provides the capability to print on a range of sizes of cutforms or passbooks. Journal printing is also available, depending on model.

Printing is bidirectional at a maximum of 120 characters per second. Printing takes place at 10, 12 or 16 2/3 cpi, selectable by application program.

Forms advance can be specified at 5 or 6 lines per inch, or in 1/90 inch steps, selectable by application program.

Shared Workstations is included, implemented by two Start keys. In a non-shared environment, printing operations can be initiated manually via either of the two separate start keys, or automatically upon sensing an inserted document. Either option can be selected under application program control.

Ribbon replacement is a "clean hands" operation.

The basic machine provides a set of 212 characters. From this set, character sets of up to 192 characters may be selected. In addition to standard alphabets and numerics, this set includes diacritic characters used in most countries, and special characters used in both data processing and word processing applications. Non-Latin Languages (Arabic, Hebrew, and Greek), and Katakana are supported via Specify Features. Sixteen customer-designable characters can be added to the character set. The above set is available in both standard and quality print. BOLD printing (2 x normal character width) is standard.

A Quality Print function is provided. When performing quality print, the 4720 makes two printing passes over each line. Both printing passes begin at the same margin, and each pass is made at one half of the normal print head speed. The quality print characters have a more formal, typewriter-like appearance suitable for applications requiring a higher print quality than the standard matrix character.

This function is not provided when printing at 16 2/3 cpi. This function is not provided on machines with the Katakana character set.

Address sharing is supported. Like and Unlike devices. (Printer with Printer and Printer with Display.)

A Locked Journal Roll function is standard on mdl 2. One- or two-part rolls of 8.5 in. width can be used. Single-part rolls may be 27.4m (90 ft) in length. Two-part rolls may be 13.7m (45 ft) in length. A tear bar is provided for the exiting paper.

The Journal Print Station is located directly behind the Document Print Station, thus allowing the same lines which print on a cut-form document to print on the journal roll.

The 4720 attaches to a 4701 controller via a loop, which operates at speeds of 1200, 2400, or 4800 bps.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of the 4720.
- Replacement of ribbon and paper. (See Supplies below).
- Performing 4720 checkout in accordance with supplied procedures for initial installation or relocation.
- Physical set-up, connection of cables in protected customer access areas including loop cables.
- Using the problem determination procedures provided with the 4720 to determine the failing unit and filling out the appropriate 4700 Problem Report prior to forwarding the failing unit to an IBM Service/Exchange Center, or calling IBM if on-site exchange service is required. See "Maintenance" below.
- Determining any required spares.
- Replacing worn or defective print heads and maintaining a supply of spare printheads.

**Maintenance:** The following services are available for an annual charge:

- IBM On-Site Exchange (IOE)
- Customer On-Site Exchange (COE)
- Customer Carry-In Exchange (CCE)
- Customer Carry-In Repair (CCR)

**IBM On-Site Exchange:** This service allows the customer to call the customer service branch office, after the customer has performed CPAR. An IBM representative will bring a replacement unit to the customer site, install the customer's print head, set-up and test the replacement unit; and remove the defective unit. The defective unit becomes the property of IBM.

**Customer On-Site Exchange:** This service allows the customer to call the customer service branch office after the customer has performed CPAR. IBM will arrange for delivery of a replacement unit to the site specified by the customer using various delivery methods. The customer is responsible for installing a print head and set-up and testing of the replacement unit using CSU procedures. The customer returns the defective unit to IBM as instructed by IBM. The delivery transportation charge to and from the customer site is paid by IBM. The defective unit becomes the property of IBM.

**Customer Carry-In Exchange:** To use this service, after isolating a defective unit using CPAR procedures, the customer calls the customer service branch office and transports the defective unit to a designated IBM Service/Exchange Center (S/EC). IBM will provide an equivalent, functioning unit on an exchange basis. The customer

should remove and retain the print head from the defective unit. The customer is responsible for delivery charges to and from the S/EC and is also responsible for set-up and testing of the replacement unit using CSU procedures. The defective unit becomes the property of IBM.

**Customer Carry-In Repair:** To use this service, after isolating a defective unit using CPAR procedures, the customer transports the defective unit to the designated IBM S/EC. The IBM S/EC will ship the defective unit to an IBM Repair Center where it will be repaired and returned to the S/EC to await customer pick-up. (The customer may ship (prepaid) a defective unit directly to a designated Repair Center in its original shipping container or equivalent. IBM will return the repaired unit prepaid.) The customer is responsible to set-up and test the repaired unit using CSU procedures.

**Hourly Service:** Hourly service may be obtained by calling the IBM toll-free number. The customer will then be given instructions for delivery the machine to IBM for such service.

**Warranty Service:** The warranty period is 3 months following the date of installation.

**Customer Carry-In Exchange service** is provided for all warranty coverage except when a Warranty Option Plan is in effect.

Not all Warranty Option plans are available in each country. Contact the country Service Department for available options and applicable terms and conditions in your country.

**Warranty Option:** This plan is intended for customers who desire a more convenient service coverage for the 3 month warranty period and for the 9 months following the warranty period.

The Warranty Options plan may be selected at the time of order by using Feature Codes #9799 or #9826. The selected plan will supersede the basic CCR service during the warranty period and will continue for 9 months following that period.

If a Warranty Option plan is ordered from the Service Branch Office after installation and during the 3 month warranty period, the plan will supersede the basic CCE service for the remainder of the 3 month period and will continue for 9 months after that period. Implementation of a Warranty Option plan during the 3 month warranty period does not extend that period.

Warranty Option plans available:

Warranty Option plan IOE - Feature Code #9799  
Warranty Option plan COE - Feature Code #9826

If IBM maintenance coverage is not contracted to begin immediately following expiration of any service and parts warranty and the customer subsequently wants IBM maintenance coverage, the machine(s) must be certified by the customer as being in good working order prior to their being placed on IBM maintenance. If not certified the machine(s) must be inspected to determine whether or not the machine(s) still qualifies for IBM maintenance. The customer must ship the machine(s) to a designated IBM Repair Center or Service/Exchange Center. A minimum charge to cover handling, inspection, cleaning, testing and return shipping charges will be applied. In addition, if the unit requires repair and repair is requested, all parts needed are billed at the prevailing IBM parts prices and the additional time required for the repair is billed at the applicable IBM service rates. The machine then becomes eligible for IBM maintenance coverage.

If in the basis of the inspection, IBM concludes that the machine is not repairable, no further work will be performed and the machine will be returned to the customer subject to the minimum charges.

**Forms Specifications:** Refer to "4700 Installation Planning Manual", GC31-2018.

**Publications:** IBM 4720 Forms/Passbook Printer Introduction and Installation Planning (GC31-2050).

The Introduction includes a product description, configuration data, forms specifications, and physical planning information for the 4720 printer.

**Cables:** For information on loop-cabling, refer to the accessories section in M4701 pages.

### SPECIFY

Unless indicated otherwise, the following specify and order codes are only available at time of manufacture.

- Power (AC, 1-phase): Specify #2998 then select one of the following:

50Hz		60Hz	
100V	#2804	100V	#2730
110V	#2805	110V	#2822
200V	#2806	120V	#9911
220V	#2813		
230V	#2821		
240V	#2801		

A line cord of 3.0m (9.8 ft) and the country approved plug will be provided at the time of shipment.

- Plugs:

(Canada only > Specify #9890 for a locking plug or #9891 for a nonlocking plug (for 120V, 1-phase, 60 Hz). <)

(Japan only > Specify #9890 for a locking plug or #9891 for a nonlocking plug (for voltages under 200 Volts). <)

(Except Canada and Japan > The 3-digit WT Country Code of the ISG Machine Order Sheet is used to select a power plug which matches the most commonly-used power supply in each country. If an exception to the above is required, a Country RPQ may be initiated. <)

**Note:** If a power supply, not the most common, is specified, and it is incompatible with the power plug commonly supplied, a power cord without a plug is shipped unless the Country RPQ referenced above is initiated.

- Machine Nomenclature:

Canadian French Bilingual #2934  
English #2927  
Japanese #2930  
Spanish #2931

- Printer Character Set Groups: Katakana #2973 128 character set. Other unique country Character Sets are generated for the terminal at time of CPGEN. They do not have to be specified at time of order.

### SPECIAL FEATURES (NONE)

### MODEL CONVERSIONS

Available at time of manufacture only.

### ACCESSORIES (NONE)

### SUPPLIES

**Paper:** 90 feet single-part journal roll action paper. Carton of 24 rolls 8.5 in. wide P/N 457363. 45 feet two-part journal roll action paper. Carton of 24 rolls 8.5 in. wide P/N 457365.

**Ribbon:** Black Ribbon, P/N 7032757.

The above Supplies may be ordered through your IBM NDD-SS Sales Representative

**Print Head, Customer Replaceable P/N 7034533:** One print head is supplied with the printer. The print head is a consumable item, and to assure maximum availability, it is recommended that the customer have one spare print head per location on hand.

The Print Head, being a consumable item should not be taken or sent to Exchange or Repair Centers. If the Print Head fails during the warranty period, the customer should call the Charlotte Hot Line 704-594-1194 collect or Tie Line 794-1194. The serial number of the

failing 4720 is required to verify the warranty period. A new Print Head will be sent to the customer. The defective Print Head will be returned to Charlotte.

**Ribbon Shield, Customer replaceable, P/N 8259646:** One ribbon shield is supplied with the print head. The ribbon shield is a consumable item and to assure maximum availability, it is recommended that the customer have a minimum of one spare ribbon shield at each location.

## 4721 SELF SERVICE DOCUMENT PRINTER

### PURPOSE

The 4721 is a document printer for self service applications in unattended lobby and vestibule environments. It attaches to a 4701 controller or a 4702 branch processor via the loop. The 4721-B01 comes with a manual card reader; the 4721-B02 comes with a motorized card reader/encoder. It extends IBM's self service banking offering.

### MODELS

**Model B01:** Manual operated identification card reader with Track 2 read, no upgrade possible.

**Model B02:** Motorized identification card reader with tracks 2 and 3 read and track 3 encode.

**Prerequisites:** For all installations, the 4721 Terminal Control Code PRPQ 7B1428 (Program #5799-WZF) has to be ordered once per customer/host from EPL Copenhagen. This is a no-charge PRPQ to be loaded from the host to the 4721. The program has to be ordered at the respective library which are APL, SAL, SPL or CPL.

For customers not having installed the 4730 Personal Banking Machine Customization Image Builder (Licensed Program #5668-870 Rel. 2.2), the 4721 Application & Installation Support Program (Licensed Program #5777-DBP) has to be ordered from EPL Copenhagen. This Program Offering includes Customization support, a sample APB and operational support for the Financial Application Program (FAP). The program has to be ordered at the respective library which are APL, SAL, SPL or CPL.

- To attach to the 4700 Banking Loop, the B-Loop Feature #3010 is required on the 4721.
- One available position on a loop of a 470X or a 5989-B01.

**Customer Setup (CSU):** Yes.

### HIGHLIGHTS

The 4721 provides a range of self service document printing applications including bank account statements, deposit balance, mail box, personal and general bank informations. It also provides the capability for account balance inquiry by means of the display. The 4721 accepts magnetic cards, PIN entries and function selections. It prints or displays the requested information, cuts the printed document, collects it if more than one sheet requested in a bundling unit and issues the documents as a bundle. A document retract capability is also provided.

In the design of the 4721 particular attention has been paid to privacy, security, appearance, physical size and human factors.

#### Standard Features:

- Customization of keyboard, display and transaction sequence. User guidance via a 40 character display.
- Numeric keyboard input for PIN, 6 function keys, encryption of PIN.
- Two models with either manual card reader or motorized reader/encoder, card retract and card capture function on motorized reader, card eject on power fail.
- Matrix printer module with 200 cps, 10/12/15 cpi, 6/8 lpi, "near letter quality" and graphics capability, document cutting and bundling, document retract for forgotten documents.
- Supported by RM 4700 AMG and RM 4700 CTRL as general purpose media (Record I/O).
- Support for major worldwide Latin languages on printer and display by a character set of 192 characters.

### DESCRIPTION

The 4721 is an intelligent self service document printer which automates financial services as account statement printing, display of the account status, printing of deposit status, mail box, general or personal customer information, as well as other information which can be defined by the banking institution.

The transaction flow of these functions can be customized to a certain extent by means of a customization image.

Customization support is provided either with the 4730 Personal Banking Machine Customization Image Builder (Licensed Program #5668-870, Rel. 2.2) or with the 4721 Application & Installation Support Program (Licensed Program #5777-DBP).

The 4721 may run in unattended mode in lobby or vestibule environment. It is offered as table top device but it is possible to mount it on a stand or integrate it into customer furniture.

The 4721 is available in two models, distinguished by the type of card reader which is a manual operated push-pull reader in 4721-B01 and a motorized reader/encoder in the 4721-B02.

Both models incorporate in addition a display for user guidance, a keyboard for PIN entry and the printer assembly.

- **Display:** The display is used for user and operator guidance. It is designed in vacuum fluorescent technology. Two lines with 20 characters each are provided. The display is equipped with a privacy filter.

The 4721 incorporates an international Latin character set of 192 characters. There is a separate highly visible READY indicator showing the status of the printer.

- **Keyboard:** The integrated horizontal keyboard is equipped with audio and tactile feedback. It consists of a numeric block for PIN entry, including one OK key and one Cancel key. Right to the numeric keys, four function keys are provided. The keyboard can be customized logically by program and physically by a customer supplied overlay. The function keys can be used for user language selection, selecting different print information or display account status. There is the provision to cover the function keys or the complete keyboard by a grid which is supplied with the machine. There are provisions for easy cleaning.
- **Identification Card Reader:** Two models of the 4721 are available, distinguished by the type of card reader.

The 4721-B01 comes with a manual operated push/pull reader with a similar user interface as it is available on the motorized reader. It provides read ISO track 2 with magnetic "stripe up" insertion. It processes cards according to ISO 2894/3554/7810.

The 4721-B02 comes with a motorized reader providing read tracks 2, 3 and write track 3. Tracks 2 and 3 adhere to ISO and ABA standards. Insertion orientation is "stripe up".

The card reader ejects a credit card (return to the user) upon power failure.

The card can be ejected to the user within a transaction by means of the cancel key. In this case the complete transaction will be canceled.

Under program control, the card reader can retain (capture) a card and there is also the capability to retract cards which were left by the user. The timeout for this function can be defined. A card bin for holding up to 30 identification cards being captured is provided.

The card reading mechanism has a lockout device which is ordinarily closed, preventing foreign objects from being inserted into the card reader. The reader recognizes the presence of a magnetic stripe when a card is inserted. The card,

if it has the correct size, is automatically fed into the reader, and the lockout gate closes for the duration of the transaction.

- Document print station: The document print station consists of the printer assembly, the cutting device and the document bundling/issue assembly. The printer prints variable length documents from single-ply fanfold paper without tractor feed holes. The friction type paper feed mechanism requires a printed mark at the left edge of the forms. Preprints are possible. The paper is cut following the printing of the document.

The speed of printing is 200 cps. Character densities of 10, 12 and 15 cpi and double wide characters are selectable by program. Line spacing is 6 lpi, 8 lpi and fractional spacing. The 4721 incorporates an international Latin character set of 192 characters for the printer.

The supported paper sizes are 150 - 216mm (5.9 - 8.5 inches) in width and 76.2 - 106mm (3.0 - 4.2 inches) in length. Possible paper weight is between 70 and 90 g/sqm. For detailed paper specifications refer to the 4721 Planning and Site Preparation Guide. The maximum paper supply is up to 2,000 forms to be stored within the printer (depends on paper weight and forms size). A major extension of the paper supply is possible in using a slot at the bottom of the 4721 to feed the paper into the printer. In this case the documents can be stored in a customer supplied printer stand or furniture. IBM supplies a specification describing a customer/vendor supplied printer stand. This offers the possibility to install the 4721 as stand-up box or included in customer furniture.

Paper load is motorized and forms positioning is done automatically. The printer contains a "paper end" and "paper jam" detection. The paper is to be supplied by the customer.

After printing and cutting of a document, it is fed into the bundling assembly. If there is more than one document to be printed for one user, the documents will be collected within the bundling unit and issued to the user as complete bundle. Maximum bundle size is ten documents. The 4721 offers the capability to retract documents which were left by the user. The timeout for this function can be defined. The retract compartment may collect up to 20 documents.

- The 4721 is attached to the 470X or the 5989 via the BLOOP. Loop speeds of 1,200, 2,400 and 4,800 baud are supported. Slot sharing is included.
- The 4721 uses the DES (National Bureau Of Standards) algorithm for PIN encryption.
- Network management support provided by either NetView or NPDA V3 handles the error description based on major and minor cause codes contained in the 4721 alert record. NetView and NPDA V3 will display available qualifier and alert identification data. The recommended actions are described in the 4721 Error Log Reference Manual GA19-5344.
- The 4721 may be completely serviced from the top and front.

#### Physical Specifications:

Width: 492mm (19.5 inches)  
Depth: 308mm (12.2 inches)  
Height: 400mm (15.8 inches)  
Weight B01: 18 kg (40 pounds)  
Weight B02: 20 kg (44 pounds)

#### Operating Environment:

Temperature - 10 to 40.6 degrees C (50 to 105 degrees F)  
Relative Humidity - 8 to 80 percent  
Wet Bulb - 26.7 degrees C (80 degrees F)

#### Publications:

- GA19-5343 - Operators Guide
- GA19-5345 - Problem Report Form

- P/N 6465632 - Repair Manual
- P/N 6465633 - Parts Catalog
- GA19-5337 - Planning & Site Preparation
- GA19-5342 - Programming Reference Manual
- GA19-5344 - Error Log Reference
- Planning & Site Preparation
  - GA11-0573 - French
  - GA12-2897 - German
  - GA10-0089 - Span/Arg.
- Operators Guide
  - GA11-0574 - French
  - GA13-1280 - Italian
  - GB11-7807 - Belgium/Dutch
  - GB11-6607 - Belgium/French
  - GA11-0923 - Danish
  - GA12-2898 - German
  - GA10-0090 - Spanish/Arg.
  - GU21-6131 - English UK
- Error Log Reference
  - GA11-0575 - French
  - GA13-1279 - Italian
  - GB11-7808 - Belgium/Dutch
  - GB11-6608 - Belgium/French
  - GA12-2899 - German
  - GA10-0149 - Spanish/Arg.
  - GU21-6132 - English UK
- Problem Report
  - GA11-0576 - French
  - GA13-1278 - Italian
  - GB11-7809 - Belgium/Dutch
  - GB11-6609 - Belgium/French
  - GA12-2900 - German
  - GA10-0151 - Spanish/Arg

#### SPECIFY

**Note:** Multiple language documentation may be shipped with the machine for countries where applicable.

The country standard Voltage/Power Cord, Nomenclature/Language will automatically be supplied based on the country code of the order.

#### SPECIAL FEATURES

**4700 BLOOP attachment (#3010):** This feature is mandatory and allows the 4721 to be attached locally or remotely to a 4701 controller, a 4702 Branch Processor or a 5989 RTAU.

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES (NONE)

#### MACHINE ELEMENTS (NONE)

#### SUPPLIES

- Print ribbon cartridge assembly, P/N 6328829
- The 4721 is equipped with a keyboard overlay, P/N 6465499. If the customer wants a different overlay it may be ordered at a vendor according to IBM specifications (refer to the IBM 4721 Planning and Site Preparation Guide).

## 4723 FINANCE COMMUNICATION SYSTEM DOCUMENT PROCESSOR

(NO LONGER AVAILABLE)

### PURPOSE

A Desk Top Reader/Inscriber with programmable functions for applications in the finance industry. The 4723 Document Processor forms a workstation together with the 4704 Display Terminal or the 3604 Keyboard Display. The 4723 attaches to the Personal Computer and the Personal Computer XT via the 4700/PC Financial Output Adapter Option. (See M5150 or 5160 pages for further information.)

The 4723 provides MICR or OCR reading/inscribing, audit trail printing, and stamping functions. Together with the 4704 or the 3604, data capture and proofing operations can be performed as well as processing of in-clearing and out-clearing of banking documents such as checks, credit transfers and bills of exchange.

### MODELS

All models provide reader, inscriber, three pockets and B-loop attachment for local connection to controllers of the 4700 and 3600 Finance Communication System.

#### Manual Feed

Model 12A	12A	OCR-A font
Model 12B	12B	OCR-B font
Model 12C	12C	CMC-7 font
Model 12E	12E	E-13B font
Model 13C	13C	CMC-7 (Shared Station)

#### Auto Feed

Model 22A	22A	OCR-A
Model 22B	22B	OCR-B
Model 22C	22C	CMC-7
Model 22E	22E	E-13B

All inscribing is done with magnetic ink.

#### Prerequisites:

1. An available position on a loop of a 4700 or 3600 Finance Communication System.
2. A 4704 Display Terminal or a 3604 Keyboard Display to form a workstation with the 4723 Document Processor.
3. For 3600 host support, PSH-RPQ program number 5799-WWB.
4. Supplies for an operational machine (see Supplies):
  - Inscriber Ribbon Cartridge
  - Stamp heads, one for each stamp feature installed
  - Ink roll, one for each stamp feature installed
  - Printer Ribbon Cartridge, if Audit Trail Print feature is installed

**Customer Setup:** Machine only.

### HIGHLIGHTS

The 4723 consists of a Document Processing Module and a Power Module connected by a 1.8 meter cable.

The basic Document Processing Module houses the manual or automatic document entrance, reader/inscriber stations and the three eject pockets of approximately 100 documents capacity each. The hopper of the automatic feed models allows for approximately 300

documents. A rear and/or front stamp station, an audit trail printer and an attachment for a 50-key Function Keyboard may be installed as optional features.

The stamps may have date included. The primary use of the rear side stamp is for endorsing, the primary use for the front side stamp is for validation.

The 4723 connects via a local loop to the 4700 or 3600 Finance Communication System Controllers.

The 4723 can be programmed to control most of the processing of a document without operator intervention or application program guidance. Decisions, such as when to inscribe, print or stamp, can be made in the 4723 for each document, also each document can be directed into one of the three pockets.

**Documents:** The pre-encoded OCR/MICR characters, print quality and codeline arrangement on the documents read by 4723 should meet the specifications recommended by ECMA and ISO for each specific font. 4723 produces characters/codelines according to the same standards. Documents within the following specifications can be processed:

Length	145 to 222mm
Width	70 to 110mm
Thickness	0.10 to 0.15mm
Weight	80 to 110 g/sq m

A document holder is available as an accessory.

**Customer Setup (CSU):** The 4723 is designated customer setup, thereby offering the customer early availability and terminal relocation flexibility. For additional information on CSU refer to the General Information (GI) section of the Sales Manual. One copy of the CSU Instructions is shipped with each 4723.

**Customer Responsibilities:** The customer must be advised that these responsibilities include:

- Assuring that the use of the equipment complies with all National, Regional and Local laws, regulations and ordinances.
- Adequate site, system and other vendor preparation.
- Receipt at the customer's receiving dock, unpacking and placement of 4723.
- Performing 4723 checkout in accordance with supplied procedures for initial installation or relocation.
- Physical set-up connection of cables in protected customer access areas including loop cables and cable that connects the Document Processing Module and the Power Module.
- Using the problem determination procedures contained in the 4723 Operator's Manual to determine the failing unit and filling out the 4700 Problem Report prior to requesting on-site maintenance service (see "Maintenance" below).
- Determining any required spares.
- Notifying IBM of intent to relocate and following IBM instructions for relocation.

**Maintenance:** Maintenance of 4723s is available under IBM Maintenance agreement contracts for on-site maintenance. It is the Customer's responsibility to install the equipment and to determine when maintenance is required. On-site maintenance is provided during the warranty period.

Customers with 4723s not covered by IBM Maintenance Agreements may have the unit(s) repaired (if the unit is repairable) for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any service and parts warranty and the customer sub-

sequently wants IBM Maintenance Agreement Coverage, he may have the machine(s) inspected.

If, on the basis of the inspection, it is concluded that the state of the machine precludes normal maintenance, the machine is returned to the customer without charge.

If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs are billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage. Power modules are separately available on request.

### Publications:

- "Introduction to the IBM 4723 Document Processor", GA19-5383
- "IBM 4723 Document Processor Operating Instructions", GA19-5384
- "IBM 4723 Document Processor Component Description", GA19-5385
- "IBM 4723 Document Processor Installation Planning", GA19-5386
- "IBM 4723 Document Processor Setup Instructions", GA19-5393

**Cables:** For information on loop cabling, refer to the accessories section of M4701.

### SPECIFY

Unless indicated otherwise, these specify feature are only available at time of manufacture.

The WT Country Code of the Machine Order Sheet is used to select Power, Power Plug and Nomenclature. Some countries have a specify option for nomenclature and power which overrides the default, see table 1.

### Power/Nomenclature:

Table 1

*-----*				
Country	Power		Nomenclatur	
	Default	Opt*	Dfault	Opt*
Argntna-613	220V 50Hz		Span	2927
Austral-616	240V 50Hz		Eng	
Canada-649	120V 60Hz		Eng	2928
Chile-655	220V 50Hz		Span	2927
Colom -661	110V 60Hz		Span	2927
Japan-760	100V 50Hz	2730	Jap	2927
Mexico-781	120V 60Hz		Span	2927
New Zea-796	230V 50Hz		Eng	
Peru-815	110V 60Hz		Span	2927

Venez-871	120V 60Hz	Span	2927
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\* Option Specify: #2730 for 100V - 60Hz, #2927 for English UK and #2928 for French.

**Note:** A power plug, which matches the most commonly used power supply in each country is mounted on the 2.8 meter machine line cord, reference GA27-2766. The line cord for Canada is 1.8m (6 ft). If an exception to the above is required, a Country RPQ may be initiated.

### SPECIAL FEATURES

**Audit Trail Printer (#2705):** Prints a maximum of 40 characters, including blanks, in one line on the back of the document. Characters are composed of a 7 x 7 dot matrix. Prints 15 characters per inch. One ribbon cartridge is delivered with the machine. For additional cartridge orders, refer to Supplies below. Field installation: No.

**Keyboard Attachment (#2706):** Provides for attachment of one 50-key Function Keyboard directly into 4723. The Keyboard should be ordered as a Workstation Element according to M4704 pages. Field installation: No.

**Stamps:** A front and/or rear stamp feature can be chosen. Front stamp (#2720), Maximum: One. Back stamp (#2721), Maximum: One. The Stamp Head includes a rubber plate the layout of which is made to customer requirements. Stamp Heads including plates are ordered as supplies. Field installation: No.

### MODEL CHANGES

Available at time of manufacture only.

### ACCESSORIES

**Document holder (P/N 4732870):** Holder for documents to be fed by the operator into the 4723. The holder is to be placed on the table surface and positioned in front of 4723 where convenient to the operator. It provides added visibility of the documents as well as adding convenience when feeding them into the 4723.

### SUPPLIES

**Inscriber Ribbon Cartridge:** Provides for inscribing of 50,000 characters (cartridge not shipped with machine). For CMC-7 font order P/N 7033612, for other fonts order P/N 7034580.

**Printer Ribbon Cartridge (P/N 7034581):** Provides printing of 1 million characters (one shipped with machine).

**Stamp Head (P/N 2694539):** Specify stamp plate content on IBM form number GX116070 (stamp heads are not shipped with the machine).

**Stamp Head with Date (P/N 2694857):** Specify stamp content on IBM form number GX11-6070 (Stamp Heads are not shipped with the machine).

**Ink Roll:** Provides color inking for at least 100,000 stampings (not shipped with machine). The following colors may be ordered: Red P/N 2694875, blue P/N 2694876 or black P/N 2694541.

## 4730 PERSONAL BANKING MACHINE

### PURPOSE

A self-service financial terminal for use in bank lobbies and vestibules, supermarkets, and other shopping and work locations.

**Note:** Certain features not available in every country. Certain models not available in every country.

### MODELS

**Model F01:** A self-service financial terminal with a basic configuration containing a 480-character 9-inch diagonal display with selection keys, a keyboard consisting of a numeric keypad and function keys with optional overlays and masks, an identification card reader with Track 2, and a 1000-statement capacity statement printer all located in a single console unit positioned to the left of a currency unit. Five currency cartridges plus one for IBM maintenance service are provided with each machine. (Additional cartridges are available as accessories.) Four security keylocks (three groups of registered keys) provide dual custody access to the check and envelope depositories. Dual custody access may also be ordered for the currency unit. In addition, model F01 may be ordered with SNA/SDLC LUO or BSC-3 or BSC-3 with 3276 emulation communications support. The basic configuration includes CNM support, an operational diskette which contains operational microcode providing diagnostics, CSU support, transaction support, and communications support, and a status switch to monitor cover and servicing door openings. Servicing doors are on the front. Customizable panels for the upper rear and upper side of the currency unit are shipped with the machine. They can be removed and repainted. They are also available as accessories for replacement or for early customization before the machine is installed. Special features which may be ordered for the Model F01 include a check depository with a capacity of 300 checks, an envelope depository, and a coin dispenser.

**Model F02:** A self-service financial terminal with a basic configuration containing two displays with selection keys, two keyboards with optional overlays and masks, two identification card readers with Track 2, and two 1000-statement capacity statement printers located in two console units, one on either side of a single currency unit. Five currency cartridges plus one for IBM maintenance service are provided with each machine. (Additional cartridges are available as accessories.) Seven security keylocks (three groups of registered keys) provide dual custody access to the check and envelope depositories. Dual custody access may also be ordered for the currency unit. In addition, model F02 may be ordered with SNA/SDLC LUO or BSC-3 or BSC-3 with 3276 emulation communications support. The basic configuration includes CNM support, an operational diskette which contains operational microcode providing diagnostics, CSU support, transaction support, and communications support, and a status switch to monitor cover and servicing door openings. Servicing doors are on the front. A customizable panel for the upper rear of the currency unit is shipped with the machine. It can be removed and repainted. It is also available as an accessory for replacement or for early customization before the machine is installed. Special features which may be ordered for the Model F02 include two check depositories with a capacity of 300 checks each, two envelope depositories, and two coin dispensers.

**Model R01:** Same as the model F01 except that the servicing doors are on the rear and the currency unit customizable panels for the upper front and upper side are shipped with the machine.

**Model R02:** Same as the model F02 except that the servicing doors are on the rear and the currency unit customizable panel for the upper front is shipped with the machine.

**Model F11:** Same as the model F01 except that the statement printer has a capacity of up to 1900 statements and the basic configuration includes an identification card reader/encoder with Track 1/2 read and Track 3 read/write, and four status switches to monitor cover

and servicing door openings, open/closed, in-use, and service required status.

**Model F12:** Same as the model F02 except that the statement printers have a capacity of up to 1900 statements each, and the basic configuration includes two identification card reader/encoders with Track 1/2 read and Track 3 read/write, and seven status switches to monitor cover and servicing door openings, open/closed, in-use, and service required status.

**Model R11:** Same as the model R01 except that the statement printer has a capacity of up to 1900 statements, and the basic configuration includes an identification card reader/encoder with Track 1/2 read and Track 3 read/write, and four status switches to monitor cover and servicing door openings, open/closed, in-use, and service required status.

**Model R12:** Same as the model R02 except that the statement printers have a capacity of up to 1900 statements, and the basic configuration includes two identification card reader/encoders with Track 1/2 read and Track 3 read/write, and seven status switches to monitor cover and servicing door openings, open/closed, in-use, and service required status.

**Model F51:** Same as the model F11 except that the currency unit and depositories area in the console are protected by heavy-duty enclosures with a key and combination lock. The customizable panels for the upper rear and upper side of the currency unit are eliminated. The model F51 basic configuration includes vandal-resistant gates and runoff channels for the check, envelope, identification card reader/encoder, statement, and cash issue openings. The check depository special feature has a capacity of 600 checks.

**Model F52:** Same as the model F12 except that the currency unit and depositories areas in the consoles are protected by heavy-duty enclosures with a key and combination lock. The customizable panels for the upper rear of the currency unit is eliminated. The model F52 basic configuration includes vandal-resistant gates and runoff channels for the check, envelope, identification card reader/encoder, statement, and cash issue openings. The check depository special features have a capacity of 600 checks each.

**Model R51:** Same as the model F51 except that the servicing doors are on the rear and the customizable panels for the upper front and upper side of the currency unit are eliminated.

**Model R52:** Same as the model F52 except that the servicing doors are on the rear and the customizable panel for the upper front of the currency unit is eliminated.

**Prerequisites:** Attaches to an available position on the Fan-out Communications Adapter of the 4701 Finance Communication Controller or communicates with the IBM 4701 controller via the EIA/CCITT Interface. If Host Connected -- a communications controller with appropriate features; see M3704, 3705, 3725, 3727 or 4321/4331/4361 (for Communications Adapter, #1601, on the 4321, 4331 and 4361) pages.

**Customer Setup (CSU):** Yes.

### HIGHLIGHTS

The 4730's modular design and configuring flexibility allow it to be ordered as a low-cost cash issuer, with selected features, or fully featured with its unique new functions. All mdls of the 4730 can be configured to issue currency in up to five denominations plus four denominations of coin; cash checks in the exact amount; validate checks for acceptance by a cashier; stack checks individually for deposit; sequentially stack enveloped deposits in the order they were deposited; and perform other financial transactions including transfers and bill payment; other documents, such as Traveler's

checks, may be dispensed if (via RPQ) they complete a document issue qualification test successfully.

- All models of the 4730 have the following features:
  - Certified for UL 291 Business Hours service
  - Deposit checks without envelopes
    - Verification through MICR reader
    - Audit trail through check printer
    - Sequentially stacked
    - Uneven amount cash back or cash withdraw
    - Accept non-MICR documents option
  - Cash checks in exact amount
    - Up to 5 denominations of currency
    - Up to 4 denominations of coin
  - Check authorization
  - Multiple check deposit with cash back
  - Multiple check cashing
  - Multiple (chained) transactions on a variable length transaction statement
  - Menu selection of transactions
  - Identification card reader with Track 2 read capability
  - Automatic customer-defined reconfiguration
    - Out of currency or coin denomination
    - When component out of service
  - Display, statement printer used for settlement, operator tasks
  - Locally stored image and microcode eliminate need to download after power loss or machine reset
  - Dispense zero-value documents
  - Calculator mode input option (fixed placement of decimal point)
  - BSC-3 support option with selectable 3276 emulation
  - S/34/36/38 SNA/SDLC attach support
  - 4730 host communications when 4730 closed
  - Host phrase changes permanent across IPLs
  - Optional device test for out-of-service devices
  - Host re-IPL command
  - Customer setup
  - Multiple language display capability; based on identifier code recorded on magnetic stripe card
  - Multiple installation usage capability; can accept magnetic stripe cards of many different card issuers.
  - Modular packaging, horizontal configuration, customizable appearance
  - Installation flexibility; free standing or in-counter installation
  - Single or dual consoles; dual consoles share common logic and currency unit providing cost savings
  - Front or rear service; front service for a free-standing installation near a wall, rear service for other free-standing installations or for in-counter installations.
  - Menu-driven service interface
  - Customer servicing activities such as replacing ribbons, replacing paper rolls, emptying depository containers,

etc., can be performed on one console of a dual console 4730 while the other console remains operational.

- Customizable panels; lower panels for all sides but service doors are provided as accessories. (See "Accessories".) The customer can leave the accessory lower panels pearl white, repaint them, or install his own lower panels (wood, veneers, etc.) in place of the accessory panels. Lower panels may not be required for in-counter installation. Upper panels are always shipped with the machine. Certain upper panels can be removed and repainted (mdls F01, F11 -- upper rear and upper side; mdls F02, F12 -- upper rear; mdls R01, R11 -- upper front and upper side; mdls R02, R12 -- upper front). If the customer wishes to have custom-finished upper panels available at the time of installation, accessory upper panels can be ordered in advance of machine shipment.
- Dynamic reconfiguration without machine closing; at customer option. Documents: Automatic recovery with documents of same or lower denomination (including substitution of coins for dollars to complete a transaction). Coin: Automatic recovery with coin lower denomination. Check Depository: Automatic recovery using envelope depository. Envelope Depository: Automatically configured out when out of service. Statement Printer: Automatically configured out when out of service. (Consumer option to complete transaction without receipt.)
- Models F11, F12, R11, R12, F51, F52, R51, and R52 have additional features:
  - Identification card reader with Track 1 read and Track 3 read/write capability
    - ▲ lockout gate with magnetic stripe recognition
    - ▲ card eject on power loss
    - ▲ card retain under program control
    - ▲ specify magnetic stripe down card insertion (standard magnetic stripe up)
  - Statement printer capacity increased to 1900 documents
  - Three status switches enable customer to provide open/closed, service required, and in-use indicators
- Models F51, F52, R51, and R52 have features to support use in unattended environments:
  - Heavy-duty enclosures for use in bank vestibules, shopping centers, other shopping and work locations
    - ▲ When shipped from the factory, models F51, F52, R51, and R52 will be listed UL 291 for 24-hour service and the intent of Regulation P for Automated Paying or Receiving Machines
    - ▲ Key and combination locks
    - ▲ Optional penetration detection devices
    - ▲ Heavy-duty enclosures and locks not serviced by IBM
  - Vandal-resistant gates and runoff channels for check, envelope, identification card reader, statement, and cash issue openings
  - Check depository capacity increased to 600 checks

#### Capacities:

Document cartridge: 2,000 new documents, approximately 1,500 used documents.

(Canada only) Coin cartridges (average per console): < (Canada only) > 1 - 410; 5 - 360; 10 - 540; 25 - 390. <)

Check depository: Models F01, F02, R01, R02, F11, F12, R11, R12: approximately 300. Models F51, F52, R51, R52: approximately 600.

Envelope depository: 325 sealed envelopes each containing an average of three documents.

## MACHINES

Statement printer: Models F01, F02, R01, R02: 1,000 3-inch statements using a 3.75-inch o.d. roll of 16-pound paper. Models F11, F12, R11, R12, F51, F52, R51, R52: 1900 3.5-inch statements using a 5.5-inch o.d. roll of 16-pound paper.

Supported currencies and coins include:

Currency	Bills	Coins
(Canada only)		
	1 dollar	1 cent
	2 dollars	5 cents
	5 dollars	10 cents
	10 dollars	25 cents
	20 dollars	
	50 dollars	<)
(A/PG only)		
Australia	2 dollars	
	5 dollars	
	10 dollars	
	20 dollars	
	50 dollars	
Singapore	10 dollars	
	50 dollars	
Thailand	100 baht	
	500 baht	
Malaysia	10 ringgit	
	50 ringgit<)	

An RPQ should be submitted for a document issue qualification test for note denominations not specified above, for traveler's checks, or for other documents. Specify currency denomination or note and issue to be tested.

**System Attachment:** The 4730 was designed to communicate with any host CPU or subhost capable of communications, via an SDLC line discipline using an SNA LU type 0 protocol, via a BSC-3 line discipline with or without 3276 emulation, or with a 4701 Controller or 4702 Processor via SNA primary attachment. The electrical interface presented by the 4730 complies with EIA Standard RS-232-C.

**Local Attachment:** For local SNA/SDLC attachment to a 4701 Finance Communication Controller or a 4702 Processor: This attachment requires that the Fan-out Communications Adapter feature #1551, and the SDLC Communications Adapter without Business Machine Clocking feature #4502, be installed on the 4701; or that the Alternate Line Attachment Port feature #3702, and the Fan-out Communications Interface feature #9646, be installed on the 4702. Supported transmission rates are: 2400 bps (122m (400 ft) maximum cable length), 4800 bps (61m (200 ft) maximum cable length), 9600 bps (30m (100 ft) maximum cable length). Refer to "IBM 4700 Finance Communication System Installation Planning", GC31-2018. Cable assembly P/N 6125820 must be ordered from Poughkeepsie, specifying the length required (connectors provided).

**Remote Attachment:** Remote SNA/SDLC attachment to a host or subhost: Requires the use of modems which are capable of supplying data clocking (see table below). Supported transmission rates are 1200, 2400, 4800, and 9600 bps. For remote attachment to the 4701 Finance Communication Controller, the EIA/CCITT Interface feature #3701, and the SDLC Communications Adapter without Business Machine Clocking feature #4502, are required on the 4701. For remote attachment to the 4702 Processor, the Alternate Line Attachment Port feature #3702 and SDLC RS-232-C interface feature #9645, are required on the 4702.

The 4730 will support Binary Synchronous multipoint, polled, line protocol at line speeds of 1200, 2400, and 4800 baud rates. This attachment requires the use of modems which are capable of supplying data clocking (see table below). The 4730 recognizes the BTAM BSE-3 implementation and the BTAM BSC-3 3276 display device implementation with EBCDIC or USASCII transmission code.

Modem	Speed (bps)	Lines
3833-1	2400	Nonsw voice grade

3834-1	4800	Nonsw voice grade
3863-1,2	2400/1200	Nonsw or Sw voice grade
3864-1,2	4800/2400	Nonsw or Sw voice grade
3865-1,2	9600/4800	Nonsw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3868-3,4	9600/4800	Nonsw voice grade
3872-1(1)	2400/1200	Nonsw voice grade
3976-3(2)	1200/600	Nonsw voice grade
5811-10	2400 to 9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400 to 9600	Nonsw baseband
5811-28		Rack mount version of 5811-20
5812-10	2400 to 9600	Nonsw baseband
5812-18		Rack mount version of 5812-10
5865-2,3	9600/7200/4800	Nonsw voice grade
5868-52		Rack mount version of 5865-2
5979-L41(2)	9600	Limited Distance COAM
(1)	Canada only	
(2)	Except Canada	

**Note:** 4-wire Switched Network Back-up is available on 3863, 3864, 3865, 5865 and 5868 modems with feature #7953 installed. 2-wire Switched Network Back-up is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch / TP coordinator for country limitations.

**External Modem Interface:** Provides a 6.1m (20 ft) cable assembly and a V.24 interface for attachment to an external IBM modem or PTT mandatory modem complying with CCITT Recommendation V.24, V.28 ISO Standard 2110 and other relevant CCITT Recommendations. Attachment to non-IBM modems or other DCEs is subject to the provision of the Multiplier Supplier Systems Bulletin.

**Cabling:** Refer to "IBM 4730 Personal Banking Machine Planning and Site Preparation Guide", GC31-2075, for information regarding the specified length (up to 40 ft) cable assembly and bulk cable. See "Accessories" for ordering instructions.

## SPECIFIED OPERATING ENVIRONMENT

**Programming Support:** The 4730 presents an application interface to host applications designed to process financial transactions and monitor 4730 operations. The 4730 application interface consists of two-message sequences which can be easily handled by CICS/VS and IMS/VS. The application messages consist of fixed-format or variable-format fields containing alphanumeric data which facilitates the development of application programs using high-level languages. These attributes make it possible for the 4730 to communicate with application programs written for a variety of host processors and operating systems.

If the 4730 is communicating with a S/370, 30XX, or 43XX series processor, existing programming support in VTAM, BTAM, and NCP can be used. User-written 4730 application programs running under CICS/VS or IMS/VS can communicate with host attached 4730s through existing CICS or IMS communications facilities. CICS or IMS support for communicating between the host and the 4701 Finance Communications Controllers or the 4702 Processor may be used when the 4730 is attached to a 4701 or 4702. Programming support for communications between the 4701 or 4702 and the 4730 is a customer responsibility.

## Application Program Products

- 4730 Personal Banking Machine:
    - Customization Image Builder, 5668-870
    - Network Monitor, 5668-871
    - Availability Management - Batch Reporting, 5668-873
    - Remote Network Monitor, 5668-872
- and the 4700 Finance Communication System Host Support, 5668-989

## Customer Responsibilities: The customer is responsible for:

1. Assuring that use of the equipment complies with all laws, regulations and ordinances.
2. Adequate site, system, and other vendor preparation.
3. Price quotations, installation, and cost (initial and recurring) of common carrier equipment and service.
4. Receipt at the customer's receiving dock, unpacking, and placing of the 4730.
5. Physical setup, connection of cables in protected customer-access areas.
6. Performing 4730 checkout in accordance with supplied procedures for initial installation or relocation.
7. Creating the customization image and loading it onto the operational diskette.
8. Checking communications with the 4701 controller or with the host processor.
9. Developing and/or obtaining and installing application programs to communicate with the 4730.
10. Using the problem determination procedures provided with the IBM 4730 to determine the failing component and filling out the appropriate 4730 Trouble Report prior to requesting on-site maintenance service (see "Maintenance" below).
11. Notifying IBM of machine relocation for IBM maintenance coverage.
12. Procuring and replacing replacement ink ribbons for the statement printer and the check printer, and replacement paper rolls for the statement printer. Ink ribbons and paper rolls are available; see "Accessories".
13. Procuring any spare or replacement accessories.
14. Procuring maintenance service for any spare or replacement locks.
15. Procuring maintenance service for heavy-duty enclosure.

## Maintenance: Maintenance of the 4730 is available under the IBM Maintenance Agreement.

IBM will not provide warranty or maintenance service on a 4730 containing money. The customer will be responsible for removing, controlling, and reloading all money in the 4730 so that IBM can fulfill its warranty and maintenance obligations. A service document cartridge is supplied with the basic machine, and a service coin cartridge is supplied with the coin feature. These cartridges are intended for use in customer problem determination and by the IBM service representative for servicing the 4730.

Customers with 4730s not covered by IBM Maintenance Agreements may have the unit(s) repaired, if repairable, on-site for a time-and-material charge.

If maintenance coverage is not contracted for immediately following expiration of any warranty and the customer subsequently wants IBM Maintenance Agreement coverage, the

customer must first have the machine(s) inspected so that eligibility for maintenance coverage may be determined. This qualification will be done at the customer's site. If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Accessories are not maintained by IBM.

## Currency Unit Operation

**Document Cartridges:** Five document cartridges are provided with the basic 4730 for customer use. An additional service document cartridge is provided for use by IBM service representatives. Additional cartridges for use as spares or replacements may be ordered. Spare cartridges permit the customer to fill some with currency while other cartridges are in use. The customer is responsible for determining if the cartridge is the failing unit within a 4730. (Except LAD> Failing document cartridges should be replaced; the document cartridge was not designed to be repaired. Service for the document cartridge under the IBM Maintenance Agreement is not offered.<) The service document cartridge must be made available by the customer to the IBM service representative for normal 4730 maintenance.

**Use new or used currency in good condition:** The general condition of used currency may vary. Used currency must be inspected to remove excessively worn, damaged, or torn bills. The "4730 Personal Banking Machine Operator's Guide for Front-Serviced 4730s", GC31-2518, and the "4730 Personal Banking Machine Operator's Guide for Rear-Serviced 4730s", GC31-2520, contain procedures for preparation of new currency and inspection of used currency for operation in the 4730.

**(Canada only > Coin Cartridges:** Each 4730 coin cartridge is used to hold one denomination of coins. Four coin cartridges are provided with the feature for customer use. An additional service coin cartridge capable of holding multiple denominations is provided for use by IBM service representatives. Additional cartridges for use as spares or replacements may be ordered. Spare cartridges permit the customer to fill some with coins while others are in use. The customer is responsible for determining if the cartridge is the failing unit within a 4730.<) (Canada only > Failing coin cartridges should be replaced; the coin cartridge was not designed to be repaired. Service under the IBM Maintenance Agreement is not offered.<) (Canada only > The service coin cartridge must be made available by the customer to the CE for normal 4730 maintenance.

**Use new or used coins in good condition:** The general condition of used coins may vary. Used coins must be inspected to remove excessively worn or damaged coins. The "4730 Personal Banking Machine Operator's Guide for Operator's Guide for Rear-Serviced 4730s", GC31-2520, contain procedures for inspection of used coins for operation in the 4730.<)

## SPECIFY

- Voltage: Country code specifies voltage and line cord. All Models: 115-120V AC, 1-phase, 60 Hz. Models F01, F02, R01, R02 only: 220-240V AC, 1-phase, 50 Hz.
- (Canada only > 120V (usable on 115V) AC, 1-phase, 60 Hz.<) (Except Canada > 240V AC, 1-phase, 50 Hz.<)
- Machine Nomenclature:
 

Canadian English	#2934
Canadian French	#2935
English US	#2924
- (A/PG only > Currency Cartridges: Specify currency cartridges to be delivered with machine. Maximum: Six (five operating cartridges plus one service document cartridge).

Specify	Currency	Issue Date	Test Date
Australia			
#2742	2 dollars		1985
#2743	5 dollars		1985
#2744	10 dollars		1985
#2745	20 dollars		1985
#2746	50 dollars		1985
Singapore			
#9172	10 dollars		1984
#9173	50 dollars		1984

Thailand			
#9174	100 baht		1984
#9175	500 baht		1984

Malaysia			
#9176	10 ringgit	1983	1984
#9177	50 ringgit	1983	1984<

- Magnetic stripe down identification card reader/encoder: Default orientation of all 4730 identification card readers and card reader/ encoders is magnetic stripe up. Specify #9540 for identification card reader/encoder orientation magnetic stripe down. Maximum: One. Limitations: Not available with mdls F01, F02, R01, R02. Field Installation: Yes.
- Dual-Custody Keylock: Specify #9550 for a second keylock provided for the currency unit. Maximum: One. Limitations: Not available with mdls F51, F52, R51, R52 or with RPQ 8V0290. Field Installation: Not recommended.
- Communications line discipline: Default communications for all 4730s is SDLC without business machine clock. Specify #9502 for SDLC communications without business machine clock. Specify #9522 for BSC communications without business machine clock. Maximum: One. Field Installation: Yes.
- Keyboard Overlays (Numeric or Alphameric Key Arrangement): For each of the standard keyboards displayed below: Specify #9301 for numeric-only keypad; Specify #9302 for alphameric keypad (alphameric arrangement is the basic touch-pad telephone format with the Q and Z added over the numeric "0" and no alpha over the numeric "1"), or specify #9303 for alphameric keypad (alphameric arrangement is the American Banking Association Standard format with the Q and Z over the numeric "1" and no alpha over the numeric "0").
- Function Key Arrangement: Specify one of the following function key arrangements. (Except LAD>Service for keyboard overlays under the IBM Maintenance Agreement is not offered.<)

*--Part 1 of 2--*			
1	2	3	4
1 Withdraw Cash	Deposit	From Checking	To Checking
2 Fixed Amount	Cash Check	From Savings	To Savings
3 Account Balance	Payment	From Credit Card	To Credit Card
4 Transfer	Other Service	From Other Account	To Other Account

*--Part 2 of 2--*			
5	6	7	8
1 1	2	3	Cancel
2 4	5	6	
3 7	8	9	Change
4 Correction	0	Dec. Point	OK

#### Standard 4730 Keyboard

As shown (numeric only): Specify #9301  
Alphameric with QZ/0: Specify #9302  
Alphameric with QZ/1: Specify #9303

*--Part 1 of 2--*			
1	2	3	4
1 Withdraw Cash	Deposit	From Checking	To Checking
2 Special	Payment Enclosed	From Savings	To Savings
3 Account Balance	Payment From Account	From Credit Card	To Credit Card
4 Transfer	Other Service	From Other Account	To Other Account

*--Part 2 of 2--*			
5	6	7	8
1 1	2	3	Cancel
2 4	5	6	
3 7	8	9	Change
4 Correction	0	Dec. Point	OK

#### Standard 3624 Keyboard

As shown (numeric only): Specify #9305 and #9301  
Alphameric with QZ/0: Specify #9305 and #9302  
Alphameric with QZ/1: Specify #9305 and #9303

*--Part 1 of 2--*			
1	2	3	4
1 Withdraw Cash	Deposit	From Checking	To Checking
2 Check Approval	Cash Check	From Savings	To Savings
3 Account Balance	Payment	From Credit Card	To Credit Card
4 Transfer	Other Service	From Other Account	To Other Account

\*--Part 2 of 2--\*  
-----

	5	6	7	8
1	1	2	3	Cancel
2	4	5	6	
3	7	8	9	Change
4	Correc- tion	0	Dec. Point	OK

-----\*

Standard Retail Keyboard

As shown (numeric only): Specify #9306 and #9301  
Alphanumeric with QZ/0: Specify #9306 and #9302  
Alphanumeric with QZ/1: Specify #9306 and #9303

\*--Part 1 of 2--\*  
-----

	1	2	3	4
1	Withdraw Cash	Deposit	From Chequing	To Chequing
2	Fixed Amount	Cash Cheque	From Savings	To Savings
3	Account Balance	Payment	From Credit Card	To Credit Card
4	Transfer	Other Service	From Other Account	To Other Account

-----\*

\*--Part 2 of 2--\*  
-----

	5	6	7	8
1	1	2	3	Cancel
2	4	5	6	
3	7	8	9	Change
4	Correc- tion	0	Dec. Point	OK

-----\*

Standard 4730 Keyboard

As shown (Canadian-English): Specify #9301 and #2934  
Not shown (Canadian-French): Specify #9301 and #2935

\*--Part 1 of 2--\*  
-----

	1	2	3	4
1	Withdraw Cash	Deposit	From Chequing	To Chequing
2	Special	Payment Enclosed	From Savings	To Savings
3	Account Balance	Payment From Account	From Credit Card	To Credit Card
4	Transfer	Other Service	From Other Account	To Other Account

-----\*

\*--Part 2 of 2--\*  
-----

	5	6	7	8
1	1	2	3	Cancel
2	4	5	6	
3	7	8	9	Change
4	Correc- tion	0	Dec. Point	OK

-----\*

Standard 3624 Keyboard

As shown (Canadian-English): Specify #9305 and #9301 and #2934  
Not shown (Canadian-French): Specify #9305 and #9301 and #2935 manuals shown preceding the section name.

	1	2	3	4	5	6	7	8
1	Withdraw Cash	Deposit	From Chequing	To Chequing	1	2	3	Cancel
2	Cheque Approval	Cash Cheque	From Savings	To Savings	4	5	6	
3	Account Balance	Payment	From Credit Card	To Credit Card	7	8	9	Change
4	Transfer	Other Service	From Other Account	To Other Account	Correc- tion	0	Dec. Point	OK

Standard Retail Keyboard

As shown (Canadian-English): Specify #9306 and #9301 and #2934  
Not shown (Canadian-French): Specify #9306 and #9301 and #2935

- Keyboard Masks: Specify one of the following keyboard masks: (Except LAD>Service for keyboard masks under the IBM Maintenance Agreement is not offered. <)

## MACHINES

12 34 567 8	12 34 567 8	12 34 567 8	12 34 567 8
1 000 0	000 0	0 0 000 0	0 0 000 0
2 000	000	0 0 000	0 0 000
3 000	000 0	0 000	0 000 0
4 000 0	000 0	0 000 0	0 000 0
#9351	#9451	#9354	#9454
1 0 0 000 0	0 0 000 0	0 0 000 0	0 0 000 0
2 0 0 000	0 0 000	0 0 000	0 0 000
3 0 0 000	0 0 000 0	0 0 000	0 0 000 0
4 000 0	000 0	0 000 0	0 000 0
#9355	#9455	#9356	#9456
1 00 00 000 0	00 00 000 0	00 00 000 0	00 00 000 0
2 00 00 000	00 00 000	0 00 000	0 00 000
3 00 00 000	00 00 000 0	0 00 000	0 00 000 0
4 0 00 000 0	0 00 000 0	00 000 0	00 000 0
#9357	#9457	#9358	#9458
1 0 00 000 0	0 00 000 0	00 00 000 0	00 00 000 0
2 0 00 000	0 00 000	00 00 000	00 00 000
3 0 00 000	0 00 000 0	00 00 000	00 00 000 0
4 0 00 000 0	0 00 000 0	00 00 000 0	00 00 000 0
#9359	#9459	#9362	#9462
1 00 00 000 0	00 00 000 0	00 000 0	00 00 000 0
2 0 00 000	0 00 000	0 000	00 00 000
3 0 00 000	0 00 000 0	0 000	00 00 000
4 0 00 000 0	0 00 000 0	0 000 0	0 000 0
#9363	#9463	#9364	#9367
1 00 00 000 0	00 000 0		
2 00 00 000	0 00 000		
3 00 00 000 0	0 000 0		
4 000 0	000 0		
#9469	#9470		
12 34 567 8	12 34 567 8		
1 00 00 000 0	00 00 000 0		
2 0 00 000	0 00 000		
3 00 00 000	00 00 000 0		
4 00 00 000 0	00 00 000 0		
#9365	#9466		
1 0 0 000 0	0 0 000 0		
2 0 0 000	0 0 000		
3 0 0 000	0 0 000 0		
4 0 0 000 0	0 0 000 0		
#9366	#9467		

## SPECIAL FEATURES

**Maintenance:** Service for 4730 Special Features is offered under the IBM Maintenance Agreement.

**Note:** All field installable special features require service personnel for field installation.

### Field Installable:

**(Except LAD> Check Depository (#1550):** Provides a check transport mechanism leading from a check slot to a MICR check reader, a check printer, and a container with a capacity of approximately 300 checks (600 checks with models F51, F52, R51, R52). One container per Check Depository is supplied with the feature. Additional containers are available as an accessory. Handles checks between 66.7mm (2.63 in.) and 108.0mm (4.25 in.) wide and between 146.1mm (5.75 in.) and 225.4mm (8.9 in.) long and between 0.09mm (0.0035 in.) and 0.18mm (0.007 in.) thick with a base weight of between 20 and 32 pounds (75 and 120 grams per square meter). The check printer will print up to 55 characters (45 characters when check authorization is implemented) of customer selected information on the check to aid reconciliation and return item processing, or to provide

data for check authorization. This information will be printed in a multiple field single line across the face of the check. The check will be printed after the check has been accepted for stacking or authorization and returned to the customer. The checks will be stacked in sequence in a container which is transportable and spill-proof. Check containers are not covered under the IBM Maintenance Agreement. Limitations: One per mdl F01, R01, F11, R11, F51, or R51; two per mdl F02, R02, F12, R12, F52, or R52. Field Installation: Yes.<)

**(Canada only> Coin Dispenser (#1650):** Transports coins from four denomination-specific coin cartridges to a coin cup located in the currency unit; four coin cartridges per Coin Dispenser are provided with the feature for customer use. An additional service coin cartridge capable of being installed in any position in the coin dispenser is provided for use by IBM service representatives. Additional coin cartridges are available as an accessory. Coin cartridges are not covered under the IBM Maintenance Agreement. The approximate coin capacities for the 4730 mdls F01, R01, F11, R11, F51, and R51 and each station of a mdl F02, R02, F12, R12, F52, and R52 are: <) (Canada only> 1 - 410; 5 - 360; 10 - 540; 25 - 390.<) (Canada only> Limitations: One per mdl F01, R01, F11, R11, F51, or R51; two per mdl F02, R02, F12, R12, F52, or R52. Field Installation: Yes.<)

**Envelope Depository (#3650):** Provides an envelope transport leading from a controlled access slot to a deposit receptacle inside the 4730. The depository transport is designed to discourage tampering with previously inserted deposits. The deposited envelopes are stacked in a portable container in sequence. The depository will accept sealed envelopes up to 12.7mm (0.5 in.) thick. It will accept the normal (maximum) size envelope for the US and Canada which is 107mm (4.2 in.) by 241mm (9.5 in.). The envelope depository will accept 325 sealed envelopes each containing an supplied with the feature. Additional containers are available as an accessory. Envelope containers are not covered under the IBM Maintenance Agreement. Limitations: One per mdl F01, R01, F11, R11, F51, or R51; two per mdl F02, R02, F12, R12, F52, or R52. Field Installation: Yes.

**Penetration Detection Devices - Currency Unit (#3450):** Provides a seismic detector and door grid for the currency unit heavy-duty enclosure; can be connected to a customer-provided alarm system. Prerequisites: Model F51, R51, F52, R52, or RPQ 8V0290. Limitations: One per machine. Field Installation: Yes.

**Penetration Detection Devices - Console (#3460):** Provides a seismic detector and door grids for the depositories heavy-duty enclosure; can be connected to a customer-provided alarm system. Prerequisites: #3450. Limitations: One per model F51 or R51; two per model F52 or R52. Field Installation: Yes.

#### (LAD only) Customer Setup CSU

**Note:** CSU special features are available on a purchase-only basis. Order by part number through < > (LAD only) your Country DP Supplies Coordinator. < > (LAD only) Customers planning to order large volumes of CSU special features should contact < > (LAD only) their Country DP Supplies Coordinator < > (LAD only) at least 120 days prior to installation. All CSU special features can be installed by the customer.

**Document Cartridges:** Document cartridges hold currency or documents for dispensing by the document dispenser. The cartridges are constructed of high impact plastic, are sealable, and are self-closing when removed from the document dispenser. A full complement of five document cartridges is provided with each machine for customer use. An additional service document cartridge is provided for use by IBM service representatives. Additional cartridges for use as spares or replacement may be ordered by part number.

P/N	Document Cartridge Description
6130541	U.S.< >

**(LAD only) Envelope Container:** The envelope container receives and holds envelopes deposited via the Envelope Depository feature. It is constructed of 2.5mm diecast aluminum with a sealable door. The container contains a spring-loaded pressure plate to insure that deposited envelopes retain the original deposit sequence. Envelopes can be removed from the container without removing the container from the machine. Alternatively, the container can be removed from the machine for secure transportation to another location for processing. Each Envelope Depository feature uses one container which can hold up to 325 sealed envelopes each containing an average of three documents. One envelope container is provided with each Envelope Depository feature. Additional containers for use as spares or replacement may be ordered by part number.

P/N	Description
6130549	Envelope Container< >

**(LAD only) Keyboard Overlays:** Each of the standard keyboard overlays that may be specified with the 4730 is available as a CSU special feature ordered by part number for replacement of the original overlay.

P/N	Description
6093950	Std 4730 Overlay- Numeric Keydp
6093946	Std 4730 Overlay- QZ over 0
6093948	Std 4730 Overlay- QZ over 1
0945708	Std 3624 Overlay- Numeric Keydp

0945707	Std 3624 Overlay- QZ over 0
5682316	Std 3624 Overlay- QZ over 1
6093834	Std Retail Overlay- Numeric Keypad
6093944	Std Retail Overlay- QZ over 0
6093942	Std Retail Overlay- QZ over 1
6093951	Std 4730 Overlay- Can./English
6093961	Std 4730 Overlay- Can./French
2335299	Std 3624 Overlay- Can./English
336118	Std 3624 Overlay- Can./French
093833	Std Ret. Overlay- Can./English
093846	Std Ret. Overlay- Can./French

**Keyboard Masks:** Each of the standard keyboard masks that may be specified with the 4730 is available as a CSU special feature ordered by part number for replacement of the original mask.

P/N	Specify Feature Equivalent
6167752	9351
6167753	9354
6167754	9355
6167755	9356
6167756	9357
6167757	9358
6167758	9359
6167759	9362
6167760	9363
6167761	9364
6167762	9365
6167763	9366
6167764	9367
6167765	9451
6167766	9454
6167767	9455
6167768	9456
6167769	9457
6167770	9458
6167771	9459
6167772	9462
6167773	9463
6167774	9466
6167775	9467
6167776	9469
6167777	9470< >

#### MODEL CONVERSIONS

The following field upgrades are supported:

Model F01 to Model F02  
Model R01 to Model R02  
Model F11 to Model F12  
Model R11 to Model R12  
Model F51 to Model F52  
Model R51 to Model R52

All other model changes available at time of manufacture only. Model upgrade orders must include additional feature orders for each feature already installed. MES orders for field installation of new features must be placed separate from model upgrade orders.

#### ACCESSORIES

Accessories are available on a purchase-only basis. Order by part number through your Country DP Supplies Coordinator. Customers planning to order large volumes of accessories should contact their Country DP Supplies Coordinator at least 120 days prior to installation.

**Warranty:** All accessories are warranted free from defects in materials and workmanship for three months. IBM's obligation is limited.

ited to providing replacement parts on an exchange basis during the warranty period.

**Maintenance:** Service for IBM 4730 accessories under the IBM Maintenance Agreement is not offered.

**(Except LAD> Document Cartridges:** Document cartridges hold currency or documents for dispensing by the document dispenser. The cartridges are constructed of high impact plastic, are sealable, and are self-closing when removed from the document dispenser. A full complement of five document cartridges is provided with each machine for customer use. An additional service document cartridge is provided for use by IBM service representatives. Additional cartridges for use as spares or replacement may be ordered by part number.

6130542	Canadian
4746966	Australian - 2 dollars
4746967	Australian - 5 dollars
4746968	Australian - 10 dollars
4746969	Australian - 20 dollars
4746970	Australian - 50 dollars
4746963	Singapore - 10 dollars
4746964	Singapore - 50 dollars
4746958	Thai - 100 baht
4746959	Thai - 500 baht
4746955	Malaysian - 10 ringgit
4746956	Malaysian - 50 ringgit<)

**(Canada only> Coin Cartridges:** Each 4730 coin cartridge is used to hold one denomination of coin. A full complement of color coded cartridges for one cent, five cent, ten cent, and twenty-five cent coins is shipped with each coin feature for customer use. An additional service coin cartridge is provided for use by IBM service representatives. Additional cartridges for use as spares or replacement may be ordered by part number.

P/N	Description
6130544	Penny
6130545	Nickel
6130547	Dime
6130548	Quarter<)

**(Canada only> Coin Cartridge Stand:** The coin cartridge stand is a durable molded plastic stand designed to hold a coin cartridge at an angle to facilitate loading the cartridge with coins. One coin cartridge stand is provided with each machine equipped with the Coin Dispenser feature. Additional stands may be ordered as accessories by part number.

P/N	Description
6130572	Coin Cartridge Stand<)

**Envelope Container:** The envelope container receives and holds envelopes deposited via the Envelope Depository feature. It is constructed of 2.5mm diecast aluminum with a sealable door. The container contains a spring-loaded pressure plate to insure that deposited envelopes retain the original deposit sequence. Envelopes can be removed from the container without removing the container from the machine. Alternatively, the container can be removed from the machine for secure transportation to another location for processing. Each Envelope Depository feature uses one container which can hold up to 325 sealed envelopes each containing an average of three documents. One envelope container is provided with each Envelope Depository feature. Additional containers for use as spares or replacement may be ordered by part number.

P/N	Description
6130549	Envelope Container

**(Except LAD> Check Container:** The check container receives and holds checks deposited via the Check Depository feature in the order they were deposited. Each Check Depository feature uses one container, which can hold up to 300 checks in a mdl F01, R01, F02, R02, F11, R11, F12, or R12, and up to 600 checks in a mdl F51, R51, F52, or R52. The check container is provided with a cover for use in

transporting checks to another location for processing. One check container is provided with each Check Depository feature. Additional containers for use as spares or replacements may be ordered by part number.

P/N	Description
6130550	Check Container - 300 checks
6050452	Check Container - 600 checks<)

**Customizable Bezels:** Each 4730 is provided with bezels with standard graphics for each identification card reader, envelope depository feature, and check depository feature. Each statement printer is provided with a bezel without graphics. Bezels without graphics can be ordered by part number as accessories. This allows the customer to customize his graphics on the bezels through silk screening or decals. The customer should not attempt to remove any standard bezel before reading the set up instructions for the customizable bezel.

P/N	Description
6125777	Customizable Card Reader Bezel - mdls F01, R01, F02, R02
6167639	Customizable Card Reader Bezel - mdls F11, R11, F12, R12
6050453	Customizable Card Reader Bezel - mdls F51, R51, F52, R52
6125776	Customizable Check Reader Bezel - mdls F01, R01, F02, R02, F11, R11, F12, R12
6050454	Customizable Check Reader Bezel - mdls F51, R51, F52, R52
6125775	Customizable Envelope Depository Bezel - mdls F01, R01, F02, R02, F11, R11, F12, R12
6050467	Customizable Envelope Depository Bezel - mdls F51, R51, F52, R52
6125778	Customizable Statement Printer Bezel - mdls F01, R01, F02, R02
6167640	Customizable Statement Printer Bezel - mdls F11, R11, F12, R12
6050468	Customizable Statement Printer Bezel - mdls F51, R51, F52, R52

**Customizable Panels:** All 4730 panels and service doors provided by IBM are finished in pearl white. Service doors are provided with the 4730 but lower panels, if required, must be ordered by part number as accessories. The customer can leave the accessory lower panels pearl white, repaint them, or install his own lower panels (wood, veneers, etc.) in place of the accessory panels. Lower panels may not be required for in-counter installation. Upper panels are always shipped with the machine. Certain upper panels can be removed and repainted (mdl F01, F11 - upper rear and upper side; mdl F02, F12 - upper rear, mdl R01, R11 - upper front and upper side; mdl R02, R12 - upper front). If the customer wishes to have custom-finished upper panels available at the time of installation, accessory upper panels can be ordered in advance of machine shipment.

Lower customizable panels can be ordered individually or grouped in panel assemblies for each model. Models F01, F02, F11, F12, F51, and F52 panel assemblies contain lower rear and side panels. Models R01, R02, R11, R12, R51, and R52 panel assemblies contain lower front and side panels. All customizable panels are provided with mounting hardware. Mounting hardware is also available separately as an accessory for mounting panels that the customer provides. Orders for customizable panels and mounting hardware should be submitted early enough to allow the customer to obtain customized panels to installation of the 4730. When an upper panel is ordered early (as an accessory), the customer will have to replace the standard panel that is always shipped on the 4730 with the one he has customized.

P/N	Customizable Panel Assembly Description
5681260	Mdls F01 (Left Console), F11
6093851	Mdl F01 (Right Console)
6050469	Mdl F51
5681220	Mdls F02, F12
6050480	Mdl F52
5681464	Mdls R01 (Left Console), R11
6093853	Mdl R01 (Right Console)
6050481	Mdl R51
5681468	Mdls R02, R12
6050482	Mdl R52
6130559	End Upper Currency Unit
6130560	Front/Rear Upper Currency Unit
6130561	Front Console
6130562	End Left Console
6130575	End Right Console
6130563	Rear Left Console
6130576	Rear Right Console
6130564	Front/Rear Lower Currency Unit
6130565	End Lower Currency Unit
6130606	Panel Mounting Hardware
	- Mdls F01, R01, F11, R11
6050483	Panel Mounting Hardware
	- Mdls F51, R51
6130607	Panel Mounting Hardware
	- Mdls F02, R02, F12, R12
6050484	Panel Mounting Hardware
	- Mdls F52, R52

**Kick Strips:** Kick strips around the base of the 4730 may not be required for in-counter installations. Kick strips are recommended for free-standing installations and are available as an accessory.

P/N	Kick Strip Description
4759166	Mdl F01, R01, F11, or R11
6050497	Mdl F51 or R51
4759167	Mdl F02, R02, F12, or R12
6050498	Mdl F52 or R52

**Privacy Display Filter:** The Privacy Display Filter is a screen replaces the display screen filter shipped with the 4730 and restricts viewing of the 4730 display screen from the side.

P/N	Description
5681234	Privacy Display Filter

**Currency Unit Security Bracket:** A currency unit security bracket that allows the currency unit to be secured to the floor is available as an accessory. Not available for models F51, R51, F52, or R52.

P/N	Description
6196223	Currency Unit Security Bracket

**Keyboard Overlays:** Each of the standard keyboard overlays that may be specified with the 4730 is available as a CSU special feature ordered by part number for replacement of the original overlay.

P/N	Description
6093950	Std 4730 Overlay- Numeric Keypd
6093946	Std 4730 Overlay- QZ over 0
6093948	Std 4730 Overlay- QZ over 1
0945708	Std 3624 Overlay- Numeric Keypd
0945707	Std 3624 Overlay- QZ over 0
5682316	Std 3624 Overlay- QZ over 1
6093834	Std Retail Overlay- Numeric Keypad
6093944	Std Retail Overlay- QZ over 0
6093942	Std Retail Overlay- QZ over 1
6093951	Std 4730 Overlay- Can./English

6093961	Std 4730 Overlay- Can./French
2335299	Std 3624 Overlay- Can./English
336118	Std 3624 Overlay- Can./French
093833	Std Ret. Overlay- Can./English
093846	Std Ret. Overlay- Can./French

**Keyboard Masks:** Each of the standard keyboard masks that may be specified with the 4730 is available as a CSU special feature ordered by part number for replacement of the original mask.

P/N	Specify Feature Equivalent
6167752	9351
6167753	9354
6167754	9355
6167755	9356
6167756	9357
6167757	9358
6167758	9359
6167759	9362
6167760	9363
6167761	9364
6167762	9365
6167763	9366
6167764	9367
6167765	9451
6167766	9454
6167767	9455
6167768	9456
6167769	9457
6167770	9458
6167771	9459
6167772	9462
6167773	9463
6167774	9466
6167775	9467
6167776	9469
6167777	9470

**Cables:** Cables to attach 4730 units may be purchased from IBM; The customer is responsible for installation and maintenance of these cables. Assembled cables may be purchased from IBM. Specify bulk cable number, cable assembly number or P/N as appropriate. Allow lead time of 90 days.

The following are "X" length cables with maximum length shown.

Cable Assy No.	Use	Length
6093901	Cable Assy, EIA/CCITT (to ext modem)	12m (40 ft)
6125820	Cable Assy, EIA/CCITT (to 4701)	122m (400 ft)

## SUPPLIES

The following 4730 supplies are available from your country DP Supplies Coordinator.

P/N	Description	Qty
7037985	Stmt Prntr Ribbon-Black	5/ctn
7033537	Stmt Prntr Ribbon-Purple	5/ctn
7032757	Check Prntr Ribbon-Black	
6109484	Stmt Printer Paper- 260' roll	50/box
1040153	Stmt Printer Paper- 570' roll	18/box
(Canada only)		
6114333	Document Separators	1500/ctn
<)		

## 4731 PERSONAL BANKING MACHINE

### PURPOSE

The 4731 Personal Banking Machine is a cash issuing machine designed for through the wall, vestibule and off-bank installations (e.g. convenience stores, supermarkets, railway stations, etc.).

### MODELS

**Model BH1:** Consists of one feed module, an IBM-provided hardened enclosure (UL-291 level safe which complies with the intent of U.S. Federal Regulation P for unattended operation) and the required logic and consumer interface elements to perform banking oriented transactions.

**Model BO1:** Consists of one feed module, attachment capability for installation into a non-IBM-provided safe and the required logic and consumer interface elements to perform banking oriented transactions.

**Maximum:** The maximum number of feed modules is four.

**Prerequisites:** Remote attachment to a host or subhost. This attachment requires the use of modems which are capable of supplying data clocking.

For SDLC communications, supported transmission rates are 1,200, 2,400, 4,800 and 9,600 bps. For remote attachment to the 4701, the EIA/CCITT interface #3701 and the SDLC Communication Adapter Without Business Machine Clocking feature #4502 are required. The A.L.A. port feature #3702 and SDLC Communications Adapter Without Business Machine Clocking feature #4502 are required on the 4702.

For BSC 3 communications, supported transmission rates are 1,200, 2,400, 4,800 and 9,600 bps.

Local attachment to a 4701 requires the Fanout Communications Adapter feature #1551 and the SDLC Communications Adapter Without Business Machine Clocking. Local attachment to a 4702 Branch Processor requires the A.L.A. port feature #3702. Supported transmission rates are 2,400 bps 122m (400 ft.) maximum cable length, 4,800 bps 61m (200 ft.) maximum cable length and 9,600 bps 30m (100 ft.) maximum cable length.

B-Loop attachment to an IBM 4701. The 4731 may be attached locally to the 4701 or it may be remotely attached. If the 4731 is attached remotely, modems such as the 3863, 3864, 3865, or the equivalent, are required. The Terminal attachment unit 3603 may also be used. The Remote Terminal Attachment Unit 5989-B01 can be used for remote attachment.

**Customer Setup (CSU):** Model BH1 is customer setup.

### HIGHLIGHTS

The 4731 provides a wide range of self-service banking services including cash withdrawals, account balance enquiry, and funds transfers between accounts. In addition, other applications may be implemented by the banks. In the design of the 4731, particular attention has been paid to physical size, appearance, human factors, ergonomic and privacy aspects. The 4731 functions include:

- Consumer Guidance from display (480 characters)
- Selection keys using the display for prompting
- Keyboard input (numeric and function keys)
- Selectable and adjustable audible feedback for keyboard entries
- Track 1 card read (IATA Standards)

- Track 2 card read (ABA and ISO standard)
- Track 3 card read/encode (ABA and ISO standard)
- JUCC read (Japanese Universal Credit Card Reader)
- PIN Validation within 4731 (application/service dependent)
- Cash issuing (up to four denominations)
- Receipt/Statement printing
- SDLC/SNA to host communication
- BSC 3 to host
- 4700 B-Loop attachment
- SDLC/SNA primary attachment to 4701/4702
- Card eject at power failure (return magnetic stripe card to user)
- Card capture (program controlled)
- Card retract of forgotten cards
- Money retract into separate bin
- Account balance enquiry
- Funds transfer from/to account
- Deliver money and receipt together at the same gate
- Menu driven transaction types
- Customized bank transactions
- Card Processing Table
- Financial institution tables for multi-bank ATM network
- Transaction chaining
- Encryption/Decryption
- Support of ECI functions in Germany/Austria.
- For Germany, a 5977 or equivalent at the host is required to do the transaction transformation from the 4731 format to the ECI format and vice-versa. The 5977 is a BSC terminal and needs the appropriate system/host support. It is the customer's responsibility to provide the application software for the 5977.
- The 4731 provides support for the language selection step, PIN entry and amount selection for ECI transactions.
- For ECI function in Austria, the "Austrian Split PIN Base" function for PIN calculation is supported.
- The support of the German private banks authorization procedure requires a 5977 or equivalent at the host to do the transaction transformation from the 4731 format to the private banks format and vice-versa. The 5977 is a BSC terminal and needs appropriate system/host support. The customer is responsible for providing the application software for the 5977.
- Cash low, cash out, printer forms low and printer forms out to host
- Dynamic reconfiguration within 4731
- Communication Network Management (CNM support)
- Provision to install the MM security system
- Model BH1 with UL-291 Safe and five sided alarm grid and dual custody Lock
- Model BO1 with provision to install into a non-IBM safe (80mm top side)

- Large character display
- Separate Operator/CE Panel
- Customer Setup (CSU) for Model BH1
- Support of major languages on printer and display
- Support of major currency notes

#### Standard Features:

**Document Feed Mechanism:** Each base model contains a document feed mechanism with one Feed Module. The number of notes dispensed to satisfy a cash withdrawal is under program control. A Currency Cartridge (available as an accessory) is installed into a Feed Module. Two different types of Currency Cartridges are available.

- **AA: Non-Locking Currency cartridge:** This cartridge provides the capability to secure the contents by the use of seals, either wire or plastic. Once the cartridge has been properly sealed, the cartridge contents cannot be removed without first removing the seal. The seal must be removed before inserting the cartridge in the Document Feed Mechanism of the 4731. If the seal is not installed, the cartridge can be easily opened without using tools or the cartridge loading frame.
- **BB: Electronically Locked Currency Cartridge:** This cartridge has an electronic lock and can only be opened by using the loading frame.

Both cartridges automatically identify their note denomination to the 4731 and a cartridge can be loaded in either of the four feed modules (three additional feed modules are available as special features). Notes will be delivered to the user of the 4731 in a bundle, containing up to a maximum of 20 notes. Rejected notes are fed to an Electronically Locked Rejected Note Cartridge which can hold approximately 300 notes. One Rejected Note cartridge is shipped with the 4731. In addition to the electronically locked rejected notes cartridge, a Non-Locked Rejected Note cartridge will also be available. This cartridge provides the optional capability to secure the contents by the use of seals, either a wire or plastic. Once the cartridge has been properly sealed, the cartridge contents can not be removed without first removing the seal. The seal must be removed before inserting the cartridge into the 4731. If the cartridge seal is not installed, the cartridge can easily be opened without using tools or the Cartridge Loading Frame.

If a receipt is generated with the cash oriented transaction, it is delivered with the notes together at the same gate. If, for some reasons, the delivered money and receipt are not taken by the customer from the cash gate, a programmable MONEY RETRACT operation takes place and retracts the complete bundle into a separate money retract bin. It is the application programs decision to keep the 4731 in service or close it for reconciliation purposes. The Cartridges must be ordered as accessories. The stack height of the Currency Cartridge is 235mm (9.25 in.). The feed cartridges are exchangeable with those already announced for the 4733 and the 4736.

**Consumer Display:** The 4731 consumer display is a 9-inch diagonal positive image display (black characters on white background) which has a 480 character capacity (12 lines each 40 characters). The location and positioning of the display provides a maximum protection from observation of information displayed by anyone other than the current user. A limited-angle privacy viewing filter is provided as a standard feature. The filter prohibits viewing the display from a side angle. The viewing angle is limited to 24 degrees on either side of the center of the screen. The display and the filter are covered by safety glass and protect the display against vandalism.

Languages supported by the display include English, Western European languages, Chinese, Hangeul, Thai, Hebrew and Arabic. For APG countries, large character fonts are available for the display in support of Chinese and Hangeul (in this case only 128 characters can be displayed on a screen). Support for large characters fonts on the 4731 display is provided as standard in the following

countries : Korea, Hong Kong, Indonesia, Malaysia, Singapore and Taiwan.

The 4731 9-inch positive image display can be used to display graphics symbols. The screen may contain text, pictures or a combination of both. The pictures may be subdivided into smaller elements and fragments. These elements can be used to build up a complete screen. "STORYBOARD" PC work station tool or equivalent program is used to create the picture elements and save it on a diskette. A PC program takes the pictures from the "STORYBOARD", assigns an ID number, compresses the files and saves it into a "Picture Library". The Picture Library resides on the 4731 diskette. The display messages which builds up the screen, consists of a Standard Character String (SCS) containing the text, picture IDs and the position of the picture. The display messages can be generated by using the CIB or equivalent or it can be transmitted from the host within a Transaction Data Record Response (TDRR).

**Consumer Keyboard:** The 4731 consists of a 12-key position numeric key block and a 4-key position function key block. The numeric key block can be arranged either in the Telefon or in the Calculator lay-out. The bottom rightmost key contains the "decimal point". The function key block consist of (from top to bottom): CANCEL - red, CORRECTION - yellow, CHANGE - orange, ENTER - green. A set of display selection keys (4 + 4) is provided adjacent to the sides of the display. The display can provide prompting messages for each of the eight display selection keys, and the customer can optionally use the keys for making selections in addition to the function/numeric keys.

A selectable and adjustable AUDIBLE feedback is provided for each key stroke.

**Credit Card Reader/Encoder:** The credit card reader/encoder on the 4731 provides for track 1 read, track 2 read, and track 3 read/write. Tracks 2 and 3 will adhere to ABA and ISO standards, Track 1 adhere to IATA standards. The card reader also supports the JUCC (Japanese) magnetic stripe standard. The card reader ejects/returns a card to the user upon power failure. A lockable card cartridge is available for holding those cards which are captured (retained) or retracted during normal operation. The lockable card cartridge can not be removed from the reader while locked. Card capture and card retract (forgotten cards) is done under program control. Mounting of the reader provides the option to insert either magnetic stripe up or magnetic stripe down (one only at a time). The 4731 will be shipped with "magn. stripe up" orientation. Conversion in the field from one orientation to the other may be done very easily by the customer in the field. A pictogram of a credit card sample is provided to show proper insertion of the credit card. For user convenience and additional environmental protection, the reader positioning is in an inclined orientation in a way that inserted objects will fall out by own gravity. In addition the card reader has a lockout device which is normally closed. At time of card insertion a sensor device recognizes the presence of the magnetic stripe and it also checks the width of the card. If the correct dimension is detected, the card is then automatically fed into the reader for processing. The lockout gate closes for the duration of the transaction.

**MM Security Box Provision:** For those countries using the MM box, an attachability is provided on the 4731.

**Operator/CE Panel:** A separate Operator/CE panel is available at the rear of the machine. The panel consists of a 9-inch monochrome display with 4 + 4 selection keys and a 12-key position keyboard. This panel is used by the operator as well as by the CE for all service activities.

**Standard Bezel:** For complete installation, the 4731 is delivered with a standard Bezel. Size of the Bezel is: 883mm (34.75 in.) width and 813mm (32 in.) height.

#### COMMUNICATIONS

One communication feature is part of the standard machine and must be selected at time of order.

**4700 B-Loop Attachment:** This feature will allow the 4731 to be attached locally or remotely to a 4701/4702 Branch Processor. For local B-Loop attachment, the customer will be instructed to provide the appropriate attachment cable (see "IBM 4731 Planning and Site Preparation Guide", GA19-5347). Included with this feature is a 12m (40 ft.) cable which will support attachment of the 4731 to an external modem for remote B-Loop communication.

The 4731 can also be attached remotely via the 5989-B01 to the 4701 and the 4702. If the 4731 is attached remotely to a 4701 or a 4702, an IBM modem or the equivalent is required (see table for "External Modems").

**SNA/SDLC Communications:** With this feature, SNA/SDLC attachment is provided in the following modes: A 12m (40 ft.) cable assembly will be provided for remote attachment of the 4731 to a 4701 Branch Processor, or to a 4321/4331 communication adapter, or to an IBM/370, 303X, 308X, 309X or 9370 via an IBM communications adapter (e.g. 3704, 3705, 3725, 3726).

**Note:** For remote attachment to the 4701, the EIA/CCITT interface feature #3701, and the SDLC Communications Adapter Without Business Machine Clocking, feature #4502, are required on the 4701. For remote attachment to the 4702, the Alternate Line Attachment Port Feature #3702 and the SDLC RS 232-C interface feature #9645 is required on the 4702. Supported transmission rates for remote SNA/SDLC communications are 1,200, 2,400, 4,800 and 9,600 bps. This attachment requires an IBM modem or equivalent. (See table below.)

This feature also supports local SNA/SDLC attachment to an 4701 or a 4702. The Fanout Communications Adapter feature #1551 and the SDLC Communications Adapter Without Business Clocking, feature #4502, must be installed on the 4701. The Alternate Line Attachment Port feature #3702 and the Communications Interface Feature #9646 must be installed on the 4702. Supported transmission rates are 2,400 bps (120m maximum/400 ft. cable length), 4,800 bps (61m maximum/200 ft. cable length) and 9,600 bps (30m maximum/100 ft. cable length). Limitation: 4701 Model 3 only. 4702.

**BSC 3 Communication:** This feature supports Binary Synchronous multi-point, polled line protocol at a line speed of 1,200, 2,400, 4,800 and 9,600 bps. The 4731 will recognize the BTAM BSC 3 implementation and the BTAM BSC3 3276 display device implementation with EBCDIC or USASCII transmission code. This attachment requires an IBM modem or equivalent. A 12m (40 ft.) cable assembly for attachment to an external modem will be provided with the BSC III communication adapter. The communication features are field installable.

#### Optional Features:

- 2nd, 3rd and 4th Feed Module
- Receipt/Statement Printer
- Diskette Audit Journal
- Extended Keyboard (plus 16 keys)
- External Contacts
- Digital Camera Interface
- Envelope Depository
- Sequence Printer
- MM box attachment feature

#### DESCRIPTION

The 4731 is a Self Service Cash Dispenser which automates a wide range of financial services and teller activities, including cash withdrawal, account balance inquiry and funds transfers between accounts, as well as other applications which can be implemented by the customer. In addition to offering services on bank interior premises like vestibules, the 4731 will satisfy the emerging requirements for outdoor, off-bank premises installations in such locations as airports, railway stations, work stations and supermarkets. The 1 to 4 denomination machine is serviced from the rear. The 4731 may be installed in vestibules (into an interior wall) or it may be installed in exterior applications where it would be exposed to the weather. The hardened enclosure provides security in non-bank

environments as well as in bank environment for unattended operations. The currency dispensing mechanism and the control logic are both contained in the safe. Particular attention has been paid to human factors, user privacy, outside appearance and physical size. Focus has been given to accommodating the various types of physical, customized installations.

The Models BH1 and BO1 have gates at the console level to protect the cash/receipt issue areas against the insertion of foreign objects. The design of the 4731 also protects against adverse effects from spilling of liquid on the user console area. The whole user area is highly protected against vandalism.

The Model BH1 contains a penetration alarm grid with contact pins for interfacing with a security alarm system. The alarm grid protects five sides of the Document Feed Mechanism enclosure. The bottom of the enclosure is not protected by the alarm grid.

The Model BO1 provides mounting hardware for easy installation of the 4731 subassembly into a non-IBM-provided safe. Supported wall thickness of the top cover of the non-IBM safe is 80mm (3.15 in.). Please refer to the "IBM 4731 Personal Banking Machine Model BO1 Security Enclosure Attachment Information" manual and the "Planning and Site Preparation Guide" for the 4731 for details about the non-IBM safe and installation requirements.

The 4731 uses the DES (National Bureau of Standards) algorithm for encryption and decryption of secret and sensitive data/information entering and leaving the 4731 on the communication facility. The DES hardware and related storage is within the safe.

A diskette drive for a 1.2MB diskette is included within the 4731 Model BH1 and Model BO1. The diskette is used for the storage of the microcode and images which characterize the operation of the machine.

The 4731 continuously monitors its devices to detect abnormal or exception conditions and reports such events to the host via special messages. If an error is detected during an operation, certain operations are retried a predetermined number of times. If unsuccessful, the function is terminated and the host and controller is notified. Recovery may require service and/or repair actions. All detected errors are logged for use by the institution in service history reporting. Under program control the user can instruct the 4731 to continue operations even when certain features not operating, e.g. receipt printer out of paper, one currency cartridge out of notes, etc. The 4731 can display different languages based on the identifier code recorded on the customer's magnetic stripe card, or based upon consumer selections made via the display. A maximum of four languages can be selected by the customer for any 4731. Languages supported on the 4731 are:

- Canadian English
- Canadian French
- Danish
- English US
- English UK
- Finnish
- French
- German
- Italian
- Spanish
- Netherlands
- Norway
- Sweden
- Arabic
- Hebrew
- Brazil Portuguese
- Hangeul
- Thai
- Chinese

The machine is equipped with a customizable logo panel. This panel is illuminated by two parallel wired fluorescent tubes. Tubes can easily be changed from the inside and are available at regular stores. An illuminated open/closed pictogram informs the user of the 4731 whether the machine is open or closed for the consumer. While the machine is in service, all apertures to the user area are closed and cannot be accessed by anyone from outside.

**Physical Specifications:**

Width: 851mm (33.5 in.)  
Depth: 1,300mm (0.51 in.)  
Height: 1,515mm (0.60 in.)  
Weight: 743kg (1,641 lbs.)

**Note:** Above specifications are given for Model BH1 (UL Safe). The weight specifies a 4 FM machine with full cartridges installed plus the Receipt/Statement printer.

Complete dimensions and weight for Model BO1 depends on the size and weight of the non-IBM safe.

**Operating Environment:**

**Inside:**

Temperature: 10 to 40 degrees C (50 to 104 degrees F)  
Relative Humidity: 8% to 80%  
Maximum Wet Bulb: 27 degrees C (80 F)

**Outside:**

Temperature: -35 to 60 degrees C (-31 to 140 degrees F)  
Relative Humidity: 5% to 100%  
Maximum Wet Bulb: 29 degrees C (85 F)

**Customer Responsibilities:** The customer is responsible for:

1. Assuring that use of the equipment complies with all Country, State and local laws, regulations, ordinances, etc.
2. Adequate site, system and other vendor preparation.
3. Price quotations, installation and cost (initial and recurring) of common carrier equipment and service.
4. Receipt at customers receiving dock, unpacking and placing of the 4731.
5. Physical setup, connection of cables in protected customer-access areas (Model BH1).
6. Procurement, installation and attachment of all non-IBM devices controlled by the External Contact Feature.
7. Procurement, installation and attachment of non-IBM camera and associated equipment controlled by the Camera Interface Feature.
8. Providing application programs to process Diskette Journal data on an IBM PC AT (or compatible devices).
9. Making available a currency cartridge and a cartridge loading frame (if electrical locked cartridges) for installation and maintenance.
10. Performing 4731 checkout in accordance with supplied procedures for initial installation or relocation (Model BH1).
11. Creating the customization image and loading it onto the operational diskette.
12. Checking communications with the 4701/4702 controller or with the host processor.
13. Using the problem determination procedure provided with the 4731 to determine the failing component and filling out the appropriate 4731 Trouble Report prior to requesting on-site maintenance service.
14. Notifying IBM of machine relocation for field service coverage.
15. Procuring and replacing replacement ink ribbons and Receipt/Statement forms for the receipt/statement printer. Ink ribbons are available from IBM.
16. Procuring any spare or replacement accessories.
17. Procuring non-IBM safe for 4731 Model BO1 and making provisions to have model BO1 installed in non-IBM safe.
18. If "MM security provision" is to be used, customer is responsible for procuring the MM hardware from vendor.
19. Cabling for 4700 B-Loop is under customer's responsibility.

**Publications:**

- GA19-5346 IBM 4731 Personal Banking Machine Information
- GA19-5347 IBM 4731 Personal Banking Machine Planning and Site Preparation
- GA19-5349 IBM 4731 Physical Planning Template
- GA19-5375 IBM 4731 Personal Banking Machine Operator's Guide
- GA19-5378 IBM 4731 Personal Banking Machine Operations Support Manual

- GA19-5379 IBM 4731 Personal Banking Machine Error Log Reference Guide
- GA19-6098 IBM 4731 Personal Banking Machine Operators Quick Reference Guide

**Customization:** The Enclosure of the 4731 Model BH1 as shipped, will be pearl white. The Front Panel as shipped will be shadow grey and the Bezel as shipped will be cloud white. As an accessory, the customer can order in advance to the delivery of the 4731 an unprinted silk screened logo panel for his own customization.

**SPECIFY**

At order time for the 4731, the customer must specify the type of Keyboard and type of Document Reject Cartridge that must be shipped with the machine.

**Keyboard type:**

- SC9301 Consumer Keyboard Telephone layout, decimal point
- SC9302 Consumer Keyboard Calculator layout, comma
- SC9303 Consumer Keyboard Telephone layout, comma
- SC9304 Consumer Keyboard Calculator layout, decimal point

**Document Reject Cartridge type:**

- SC9000 for Electronically Locked rejected note cartridge
- SC9001 for Non-Locking rejected note cartridge

**Alternate Languages:**

- SC2923 for Dutch
- SC2924 for US English
- SC2927 for UK English
- SC2928 for French
- SC2929 for German
- SC2931 for Spanish
- SC2932 for Italian

**SPECIAL FEATURES**

One of the following three special features for communications must be ordered with a 4731:

- Feature Code #3005 SNA/SDLC Communication
- Feature Code #3010 4700 B-Loop Attachment
- Feature Code #3035 BSC III Communication

**SNA/SDLC Communications (#3005):** With this feature, SNA/SDLC attachment is provided in the following modes: A 12m (40 ft.) cable assembly will be provided for remote attachment of the 4731 to a 4701, or to a 4321/4331 communication adapter, or to an IBM/370, 303X, 308X, 309X or 9370 via an IBM communications adapter (e.g. 3704, 3705, 3725, 3726).

**Note:** For remote attachment to the 4701, the EIA/CCITT interface feature #3701, and the SDLC Communications Adapter Without Business Machine Clocking, feature #4502, are required on the 4701.

For remote attachment to the 4702, the Alternate Line Attachment Port Feature #3702 and the SDLC RS232-C interface feature #9645 is required on the 4702. Supported transmission rates for remote SNA/SDLC communications are 1,200, 2,400, 4,800 and 9,600 bps. This attachment requires an IBM modem or equivalent (see "external modems" below).

This feature also supports local SNA/SDLC attachment to an 4701 or a 4702. The Fanout Communications Adapter feature #1551 and the SDLC Communications Adapter Without Business Clocking, feature #4502, must be installed on the 4701. The Alternate Line Attachment Port, feature #3702, and the Communications Interface Feature #9646 must be installed on the 4702. Supported transmission rates are 2,400 bps (120m maximum/400 ft. cable length), 4,800 bps (61m maximum/200 ft. cable length) and 9,600 bps (30m maximum/100 ft. cable length). Limitations: Can not be installed

with #3010 or #3035. Field Installation: Conversion to #3010 or #3035 requires an RPQ.

**4700 B-Loop Attachment (#3010):** This feature will allow the 4731 to be attached locally or remotely to a 4701 and a 4702 Branch Processor. For local B-Loop attachment, the customer will be instructed to provide the appropriate attachment cable (see "IBM 4731 Planning and Site Preparation Guide", GA19-5347). Included with this feature, is a 12m (40 ft.) cable which will support attachment of the 4731 to an external modem for remote B-Loop communication. The 4731 can also be attached remotely via the 5989-B01 to the 4701 and the 4702. If the 4731 is attached remotely to a 4701, or to a 4702 an IBM modem or the equivalent is required. Limitations: Cannot be installed with #3005 or #3035. Field Installation: Conversion to #3005 or #3035 requires an RPQ.

**BSC 3 Communication (#3035):** This Feature supports Binary Synchronous multi-point, polled line protocol at a line speed of 1,200, 2,400, 4,800 and 9,600 bps. The 4731 will recognize the BTAM BSC 3 implementation and the BTAM BSC3 3276 display device implementation with EBCDIC or USASCII transmission code. This attachment requires an IBM modem or equivalent (see "external modems" below). A 12m (40 ft.) cable assembly for attachment to an external modem will be provided with the BSC 3 communication adapter. Limitations: Cannot be installed with #3005 or #3010. Field Installation: Conversion to #3005 or #3010 requires an RPQ.

## External Modems

Modem	Speed (bps)	Line
3603 mdl 2	2400/1200	Nonswitched
3833 mdl 1	2400	Nonswitched
3834 mdl 1	4800	Nonswitched
3863 mdl 1	2400/1200	Nonswitched
3864 mdl 1	4800/2400	Nonswitched
3865 mdl 1/2	9600/4800	Nonswitched
3868 mdl 1	2400/1200	Nonswitched
3868 mdl 2	4800/2400	Nonswitched
3868 mdl 3/4	9600/4800	Nonswitched
3872 mdl 1*	2400/1200	Nonswitched
3976 mdl 3**	1200/600	Nonswitched
5979-L41**	9600	Limited Distance
5989-B01		

\* 3872 mdl 1 for Canada only

\*\* 3976 and 5979 not for Canada

The 4731 can also be attached to the following IBM Modems:

Modem	Speed (bps)	Line
5865	4800/9600	Nonswitched
5866	9600	Nonswitched
5868	9600	Nonswitched
5811	2400/4800	Limited Distance Modem
	7200/9600	
5812	2400/4800	Limited Distance Modem
	7200/9600	

**External Modem Interface:** Provides a 12m (40 ft.) cable assembly and a V.24 interface for attachment to an external IBM modem or PTT mandatory modem complying with CCITT recommendation V.24, V.28 ISO Standard 2110 and other relevant CCITT recommendation. Attachment to non-IBM modems or other DCEs is subject to the provision of the Multiple Supplier System Bulletin.

The following special features can be ordered optionally:

- #3015 Additional Feed Modules
- #3020 Receipt/Statement Printer
- #3030 MM Security Box Attachment
- #3039 Extended Keyboard
- #3050 Digital Camera Interface
- #3055 Diskette Journal
- #3060 External Contacts
- #3243 Envelope Depository
- #3245 Sequence Printer

**Additional Feed Modules (#3015):** This feature provides an additional feed module for a Non-Locked or Electronically locked currency cartridge in the 4731. Maximum: Three additional Feed Modules can be ordered for a 4731 Model BH1 and Model BO1. Field Installation: Yes.

**Receipt/Statement Printer (#3020):** The transaction Receipt/Statement printer prints on variable size receipts and statements and preprinted fan fold single ply paper. The form size is 101.6mm (4 in.) or 105.8mm (4.16 in.) vertical and between 150mm and 216mm (6 to 8 in.) horizontal. The print speed is 200 character/second (cps). The horizontal spacing is 10 and 12 characters/inch (cpi) and line spacing is done with 6 or 8 lines/inch (lpi). Paper weight is 70 - 90 grams/sqm. Depending of the horizontal size of the document, the number of characters printed per line is 64 to 95. Highlighting of characters can be accomplished by means double-dotting (double printing). Such characters will have twice the width of a normal character. After completion of the document printing, an automatic cutting device cuts the document. The paper supply compartment can hold up to 5000 documents. Field Installation: Yes.

**MM Security Box Attachment (#3030):** For those countries using the MM box, an attachment capability is provided by this feature. The MM Security System cable and sensor will be installed, tested and adjusted at the IBM plant if ordered at machine order time. Installation of the MM Security Box is the customer's responsibility. Field Installation: Yes.

**Extended Keyboard (#3039):** Exclusively to the standard consumer keyboard (12+4 keys), an extended consumer keyboard (+16 function keys) can be ordered. The keyboard is extended to the left side with additional 16 function keys. Physical arrangement provides for four rows (each consists of 4 keys) divided into two blocks. Color of the keys are either: Blue, Red, Green, White or Yellow. Customers with 3624s and 4736s installed, have the opportunity to provide their users the same "User <-> Machine" interface on the 4731. Limitation: Plant installation only.

**Digital Camera Interface (#3050):** The 4731 Camera Interface Feature provides signals to a non-IBM camera to allow it to be triggered at specific points in the 4731 transaction sequence. ASCII Data will be supplied to the non-IBM camera to allow capture of time, date, transaction sequence number, 4731 machine identifier and a code defining the step in the transaction sequence at which the specific frame was captured. Additional alphanumeric data can optionally be supplied to the non-IBM camera by the host computer application program. The Camera Interface will receive the following status from the non-IBM camera, if provided, and pass them on to the host application:

- Low media (film, videotape)
- Out of media
- Camera unavailable

Field Installation: Yes.

**Diskette Journal (#3055):** The Diskette Journal Feature provides a second diskette drive in the 4731. All financial transactions attempted on the 4731 are written to the Diskette Journal. All transaction records and transaction responses are journaled. Journaling will take place for both successful and unsuccessful transactions. Diskette Journal capacity is at least 1,500 transactions. The diskette has a capacity of 1.2Mb. The contents of the diskette can be displayed or printed using an IBM PC AT (or compatible device). A sample PC AT program is provided to assist the user in writing an application program to satisfy user requirements. When the diskette is full, the user can optionally cause the 4731 either to close or to suspend use of the Diskette Journal Feature. Field Installation: Yes.

**External Contacts (#3060):** The External Contacts Feature provides six contacts which will allow the customer to attach and control non-IBM devices or Indicators. The function of the contacts are as follows:

- Open Contact: This contact closes when the 4731 is available to process user (Financial Institution customer) transactions.

- Closed Contact: This contact closes when the 4731 is not available to process user transactions.
- Safe Door Open Contact: This contact closes when the safe door is opened.
- Any Door Open Contact: This contact closes when any door of the upper compartment will be opened.
- Camera Contact: This contact closes at the beginning of a user transaction after Magn.Card read and it can be used to activate any recording equipment.
- Intervention Required Contact: This contact is a normal open/normal close contact and is activated under following conditions:
  - Printer paper low or out
  - Printer Jam
  - Document low or out
  - Document dispenser jammed
  - Credit Card Reader jammed
  - MM security device out of service

The External Contact Feature is compatible with the equivalent feature on 3624. The same cable may be used to connect to the 4731. Field Installation: Yes.

**Depository (#3243):** Provides Envelope transport mechanism leading from a transaction controlled gate to a controlled access slot in the security enclosure to deposit receptacle inside the 4731. In addition to the controlled gate at the consumer console and the controlled access slot in the security enclosure, the depository transport is designed to discourage tampering with previously inserted deposits. Deposit envelopes may vary in size from 89mm x 152mm (3.5 x 6 in.) to 114mm x 247mm (4.5 x 9.75 in.) and shall be constructed of paper having basis weight of sub 20 through sub 28. Maximum thickness of a deposit envelope and its contents is 12.7mm (0.5 in.). Capacity of the envelope container/bin is about 300 envelopes. However, number of envelopes depends on the average size and thickness of the envelopes. Prerequisite: Sequence Printer #3245. Limitation: Plant installation only.

**Sequence Printer (#3245):** Prints sequence number on envelope as it passes through the depository throughout. Six numeric digits are printed horizontally at repeated intervals along the envelope. Three digits are set by the customer to identify unit, and three digits are automatically sequenced when the envelope passes the print station. It is the customers responsibility to purchase and replace ink roll when required. Limitation: Plant installation only. Prerequisite: Depository feature #3243.

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

The 4731 will be shipped with one currency reject cartridge, one lockable retained card bin, and one display privacy filter. Replacement accessories and spares may be ordered from IBM. No Currency Cartridges are shipped with the base machine and must be ordered as accessories. A cartridge loading frame accessory is required to open the electronically locked currency and rejected note cartridges. The following accessories can be ordered from IBM:

- \*Currency Cartridge (electronically locked)
- \*Currency Cartridges Non-locked
- \*Rejected Note cartridge electronically Locked/Power
- \*Rejected Note cartridge Non-Locked/Power
- (Canada only) >Rejected Note cartridge electronically locked/standard
- \*Rejected Note cartridge Non-Locked/standard <)
- \*Cartridge loading frame (opens electronically locked currency and rejected note cartridge) (P/N 56X1550)
- Unprinted silk screened Logo panel (P/N 74X1848)
- Pedestal 85mm (3.4 in.) height (P/N 74X1878); Maximum stack height is 255mm

(Except LAD> \* Repair Center Services Accessories <)

(Except LAD> Accessories:

Country	Denom.	Cartridge	
		Non-Loc.	Locked
Argentina	1	56X1764	56X1445
Argentina	10	56X1765	56X1446
Australia	5	56X1767	56X1429
Australia	10	56X1768	56X1430
Australia	20	56X1769	56X1431
Canada	5	56X1781	56X1414
Canada	10	56X1782	56X1415
Canada	20	56X1783	56X1416
Chile	500	56X1785	56X1447
Chile	1.000	56X1786	56X1448
Colombia	500	56X1787	56X1449
Colombia	1.000	56X1788	56X1450
Costa Rica	500	56X1907	56X1517
Ecuador	100	56X1794	56X1499
Ecuador	1.000	56X1796	56X1501
Guatemala	5	56X1904	56X1514
Guatemala	10	56X1905	56X1515
Hong Kong	10 HKSB	56X1806	56X1451
Hong Kong	100HKSB	56X1807	56X1452
Hong Kong	10 SCB	56X1806	56X1451
Hong Kong	100SCB	56X1807	56X1452
Indonesia	1.000	56X1808	56X1453
Indonesia	10.000	56X1809	56X1454
Jamaica	5	56X0561	56X1525
Jamaica	10	56X0562	56X1526
Korea	1.000	56X1823	56X1455
Korea	10.000	56X1825	56X1456
Malaysia	10	56X1830	56X1457
Malaysia	50	56X1832	56X1458
Mexico	1.000	56X1835	56X1460
Mexico	5.000	56X1906	56X1516
Neth.Antil.	25	56X0565	56X1529
Neth.Antil.	50	56X0566	56X1530
New Zealand	5	56X1841	56X1461
New Zealand	10	56X1842	56X1462
New Zealand	20	56X1843	56X1463
Panama	1	56X1891	56X1406
Panama	5	56X1892	56X1407
Panama	10	56X1893	56X1408
Panama	20	56X1894	56X1409
Panama	50	56X1895	56X1410
Peru	100	56X1908	56X1518
Peru	50.000	56X1848	56X1477
Philippines	50	56X1912	56X1522
Philippines	100	56X1913	56X1523
Singapore	10	56X1860	56X1464
Singapore	50	56X1861	56X1465

## MACHINES

Sri Lanka	100	56X0583	56X1355
Sri Lanka	500	56X0573	56X1536
Thailand	100	56X1885	56X1468
Thailand	500	56X1886	56X1469
Uruguay	1000	56X1909	56X1519
Venezuela	50	56X1897	56X1470
Venezuela	100	56X1898	56X1471

IBM will periodically announce support for additional currencies supported.< )

### Cartridge Loading Frame:

Argentina	6465117
Australia	6464692
Canada	6464912
Chile	6465118
Colombia	6465119
Costa Rica	6465119
Hong Kong	6464848
Indonesia	6464849

Jamaica	6465117
Korea	6465122
Malaysia	6464848
Mexico	6465119
Neth.Antilles	6465122
New Zealand	6464692
Peru	6465117
Philippines	6465122
Singapore	6464848
Sri Lanka	6464851
Thailand	6465129
Uruguay	6465000
Venezuela	6465122
Panama	6465119

	Reject Cartridge Non-Lock	Locked
(Canada only>		
Standard	56X1750	56X0887<)
Power	56X1757	56X0890

### Supported Notes:

		Quality of Notes	Comments/ Restriction
Argentina	1, 10 Austral	Mint Used	
Australia	5, 10, 20 Dollar	YES YES	All Mint Notes
Canada	5, 10, 20 Dollar	YES YES	facing restrictions
Chile	500, 1000 Peso	YES YES	
Colombia	500, 1000 Peso	YES YES	
Costa Rica	500 Colones	YES YES	
Ecuador	100, 1000 Sucres	YES YES	
Guatemala	5, 10 Quetzales	YES YES	
Hong Kong	10, 100 Dollar SCB	YES YES	1985 issue only
Hong Kong	10, 100 Dollar HKSB	YES YES	1985 issue only
Indonesia	1000, 10.000 Rupiah	YES YES	
Jamaica	5, 10 Dollar	YES YES	5 mint only
Korea	1000, 10.000 Won	YES YES	
Malaysia	10, 50 Ringgit	YES YES	
Mexico	1000, 5000 Peso	YES YES	
Neth.Antilles	25, 50 Gulden	YES YES	
New Zealand	5, 10, 20 Dollar	YES YES	
Panama	1, 5, 10, 20, 50 Dollar	YES YES	50.000 used only
Peru	100, 50.000 Intis/Soles	YES YES	Mint notes facing
Philippines	50, 100 Pesos	YES YES	restrictions
Singapore	10, 50 Dollar	YES YES	10 Mint facing
Sri Lanka	500 Rupiah	YES YES	restrictions
Thailand	100, 500 Bath	YES YES	100 used only
Uruguay	1000 New Peso	YES YES	
Venezuela	50, 100 Bolivar	YES YES	

### MACHINE ELEMENTS (NONE)

#### SUPPLIES

- Depository ink roll (P/N 457149)
- Receipt/Statement Printer ink ribbon
- Card reader head cleaning cards

- Card reader test cards

The following starter set of supplies will also be shipped with each 4731 and additional quantities may be ordered from IBM:

- Depository ink roll (P/N 457149)
- Receipt/Statement Printer ink ribbon
- Card reader head cleaning cards
- Card reader test cards

## 4733 TELLER ASSIST UNIT

### PURPOSE

A multi-denomination teller assist unit (TAU) designed for the teller cash handling application.

### MODELS

**Model 1 001:** 4 denominations - no upgrade possibility

**Model 2 002:** 4 denominations - possibility to upgrade to 5 or 6 denominations

**Prerequisites:** Electronic or non-locking currency cartridges, an electronic or non-locking reject cartridge, and a loading module or loading stand have to be ordered separately (refer to "Accessories" section) well in advance to make sure all accessories arrive in time.

**Note:** Additional spare cartridges (currency, reject and deposit) have to be ordered as accessories from IBM Direct.

**Customer Setup (CSU):** No.

### HIGHLIGHTS

The 4733 is a multi-denomination Teller Assist Unit (TAU) designed for teller cash handling applications. Installations will be in lobbies only and always attended. The 4733 is not intended for operation in outside weather conditions.

The 4733 includes support for at least four denominations, a 3mm enclosure, time lock, two deposit cartridges. The position of the cradle containing the notes indicates which one of the two tellers requested the cash.

Cash notes (old and new) will be dispensed in a bundle composed of one to six denominations of currency. The notes are individually fed from electronic currency cartridges, but are escrowed and presented to the teller in a single bundle.

The 4733 can attach to an IBM 470X Branch Processor via the banking loop (B-Loop) or to any other controller/PC/terminal via the EIA RS-232-C interface (CCITT V.24, Start/Stop).

**Note:** SDLC and RS-232-C are exclusive on the IBM PC.

Currency cartridges hold approximately 2,000 bills; reject cartridges hold about 300 note bills.

The 4733 is available only in countries listed in Accessories - Electronic/Non-Locking Currency Cartridges.

Additional countries/currencies will be supported after successful currency issue test. To request a currency issue test for a non-supported currency/denomination, submit an RPQ to FS Boeblingen Germany.

### Bibliography

GA19-5425  
GA19-5426  
GA19-5429

### SPECIFY (NONE)

**Note:** The 3-digit Country Code on the DP Machine Order Sheet will be used to select a power plug which matches the most commonly used power supply in the country. The same code will be used to select the machine's nomenclature.

### SPECIAL FEATURES

#### Non-Communications Features

**Feed Module (#3010):** Provides an additional Feed Module. Limitations: Available for 4733-002 only. Maximum: Two. Field Installation: Yes.

#### Communication Features

**Banking Loop Adapter (#3005):** Provides capability to attach to 4700 loop. Attachment to local loop is directly. Maximum: One. Field Installation: Yes. Prerequisites: Available position on the loop.

### MODEL CONVERSIONS (NONE)

### MAINTENANCE

Maintenance of the IBM 4733 is available under the IBM Maintenance Agreement.

IBM will not provide warranty or maintenance service on a 4733 containing money. The customer will be responsible for removing, controlling and reloading all money in the 4733 so that IBM can fulfill its warranty and maintenance obligations. One empty currency cartridge is required by the customer for problem determination and for the CE for servicing the 4733. The denomination of this empty cartridge should match the denomination of the test notes shipped with the 4733.

Customers with 4733s not covered by an IBM Maintenance Agreement may have the unit(s) repaired, if repairable, on-site for a time-and-material charge.

If maintenance coverage is not contracted for immediately following expiration of any warranty and the customer subsequently wants IBM Maintenance Agreement coverage, the customer must first have the machine(s) inspected so that eligibility for maintenance coverage may be determined. This qualification will be done at the customer's site. If the unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement coverage.

Electronic/non-locking currency cartridges, electronic/non-locking reject cartridges, deposit cartridges and loading modules/stands are accessories; they may be repaired at an IBM designated Repair Center. Problem determination and shipping of the cartridges and loading modules is the customer's responsibility.

### ACCESSORIES

The following items are available on a purchase-only basis through IBM Direct channels.

The deposit cartridges have mechanical locks and need mechanical keys to open. The electronic currency cartridges and the electronic reject cartridges are electronically locked and require a loading module to open for loading or removing of note bills.

The non-locking currency cartridge provides the optional capability to secure the contents by the use of seals, either wire or plastic. Once the cartridge has been properly sealed, the cartridge contents cannot be removed without first removing the seal. The seal must be removed before inserting the cartridge in the document feed mechanism of the 4733.

If the cartridge seal is not installed, the cartridge can be easily opened without using tools or the cartridge loading stand.

## MACHINES

The non-locking currency reject cartridge provides the optional capability to secure the contents by the use of seals, either wire or plastic. Once the cartridge has been properly sealed, the cartridge contents cannot be removed without first removing the seal. The seal must be removed before inserting the cartridge in the currency feed mechanism of the 4733.

If the cartridge seal is not installed, the cartridge can be easily opened without using tools or the cartridge loading frame.

The loading stand assists in the proper loading of the currency cartridges (non-locking) by holding them at the correct angle. This angle allows the proper tension setting to be made, and it also provides clearance for the latch which projects from the rear of the cartridge when it is open. If the customer already has a cartridge loading module accessory for servicing electronically-locked cartridges, it may also be used to service the new non-locking cartridges.

- Deposit Cartridge P/N 6464846
- Electronic Reject Cartridge P/N 56X0887
- Electronic Currency Cartridge

Part number Denomination

Australia  
56X1428 2 (used)  
56X1429 5 \* (used)  
56X1430 10 (used)  
56X1431 20 (used)  
56X1432 50 (used)  
56X1427 100 (used)

Canada  
56X1412 1  
56X1413 2 (new/old iss)  
56X1414 5 \* (new/old iss)  
56X1415 10  
56X1416 20  
56X1417 50

56X1406 1 \$ US (used)  
56X1407 5 \$ US (used)  
56X1408 10 \$ US (used)  
56X1409 20 \$ US (used)  
56X1410 50 \$ US (used)

If US and Canadian denominations are used in the same machine, the application program has to secure correct issue.

Mexico  
56X1460 1000  
56X1537 2000  
56X1516 5000  
56X1538 10000  
56X1539 20000  
56X1540 50000

Panama  
56X1406 1 \$ US (used)  
56X1407 5 \$ US\* (used)  
56X1408 10 \$ US (used)  
56X1409 20 \$ US (used)  
56X1410 50 \$ US (used)

Singapore  
56X1362 1 (new issue)  
56X1464 10\* (bird iss)  
56X1465 50 (bird/new iss)

Thailand  
56X1468 100 \* (used)

56X1469 500 (used)

Venezuela  
56X1470 50 \*  
56X1471 100 \*

\* Denomination of test notes provided with shipment of 4733.

- Non-locking Currency Reject Cartridge P/N 56X1750
- Non-locking Currency Cartridge

Part number Denomination

Australia  
56X1766 2 (used)  
56X1767 5 \* (used)  
56X1768 10 (used)  
56X1769 20 (used)  
56X1770 50 (used)  
56X0572 100 (used)

Canada  
56X1779 1  
56X1780 2 (old/new issue)  
56X1781 5 \* (old/new issue)  
56X1782 10  
56X1783 20  
56X1784 50

56X1891 1 \$ US (used)  
56X1892 5 \$ US\* (used)  
56X1893 10 \$ US (used)  
56X1894 20 \$ US (used)  
56X1895 50 \$ US (used)

If US and Canadian denominations are used in the same machine, the application program has to secure correct issue.

Mexico  
56X1835 1000  
56X0574 2000  
56X1906 5000  
56X0575 10000  
56X0576 20000  
56X0577 50000

Panama  
56X1891 1 \$ US (used)  
56X1892 5 \$ US\* (used)  
56X1893 10 \$ US (used)  
56X1894 20 \$ US (used)  
56X1895 50 \$ US (used)

Singapore  
56X0588 1 (new issue)  
56X1860 10\* (bird iss.)  
56X1861 50 (bird/new iss.)  
56X0589 100 (bird issue)

Thailand  
56X1885 100 \* (used)  
56X1886 500 (used)

Venezuela  
56X1897 50 \*  
56X1898 100 \*

\* Denomination of test notes provided with shipment of 4733.

- Loading Stand (non-locking cartridges) P/N 56X1550

- Loading Module: Prerequisite for each customer site.

Country	P/N
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Australia	6464692
Canada	6464912
Mexico	6465119

**MACHINES**

Panama	6465119
Singapore	6464848
Thailand	6465129
Venezuela	6465122

**SUPPLIES (NONE)**

## 4736 PERSONAL BANKING MACHINE

### PURPOSE

A cash issue machine designed for bank lobby and vestibule applications, as well as for indoor, off-bank premises applications (e.g., convenience stores, supermarkets, railway stations, etc.).

### MODELS

**Model RH2:** 2 document feed modules, an IBM-provided hardened enclosure (UL-291 level safe which complies with the intent of U.S. Federal Regulation P for unattended operation), and serviced/maintained from the rear.

**Model RS2:** 2 document feed modules, an IBM-provided soft enclosure (UL-291 level enclosure which complies with the intent of U.S. Federal Regulation P for attended operation), and serviced/maintained from the rear.

(Except Canada > **Model R02:** 2 document feed modules, sub-assemblies which will be shipped for attachment in a non-IBM provided safe. The machine is serviced/maintained from the rear. <)

**Prerequisites:** Remote attachment to a host or subhost. This attachment requires the use of modems which are capable of supplying data clocking, or their equivalent, which are capable of supplying data clocking.

For SDLC communications supported transmission rates are 1200, 2400, 4800, and 9600 bps. For remote attachment to the 4701 Controller, the EIA/CCITT interface (#3701), and the SDLC Communications Adapter Without Business Machine Clocking (#4502) are required on the 4701. The A.L.A. port (#3702) and SDLC Communications Adapter Without Business Machine Clocking (#9645) are required on the 4702.

For BSC III communications support transmission rates are 1200, 2400 and 4800 bps.

Local attachment to a 4701 Controller requires the Fanout Communications Adapter (#1551), and the SDLC Communications Adapter Without Business Machine Clocking. Local attachment to a 4702 Branch Processor requires the A.L.A. port (#3702) and #9646. Supported transmission rates are 2400 bps (122m, 400 ft, maximum cable length), 4800 bps (61m, 200 ft, maximum cable length), and 9600 bps (30m, 100 ft, maximum cable length).

BLOOP attachment to a 4701 or 4702 Controller. The 4736 may be attached locally to the controller or it may be remotely attached. If the 4736 is attached remotely, modems such as the 3603, 3863, 3864, 3865, or the equivalent, are required.

**Customer Setup (CSU):** Yes.

### HIGHLIGHTS

The 4736 provides a wide range of self-service banking services including cash withdrawal, account balance inquiry, and funds transfer between accounts. In addition, other applications may be implemented by the bank customer.

In the design of the 4736, particular attention has been paid to physical size, appearance, human factors, and privacy. Focus has been given to accommodating various types of physical, customized installations, in bank lobbies and vestibules, and certain non-bank locations such as airports, railway stations, department stores, etc. 4736 functions include:

- Guidance from display (480-character CRT)
- Selection keys using the display for prompting (keys are adjacent to sides of display)
- Keyboard input (numeric and function keys)

- Audio and tactile feedback for keyboard entries
- Track 1 card read (IATA standards)
- Track 2 card read (ABA and ISO standards)
- Track 3 card read/encode (ABA and ISO standards)
- JUCC read (Japanese Universal Credit Card Reader)
- PIN validation directly within the 4736 (customer option)
- Cash issuing (up to 2-denominations)
- Account balance inquiry
- Funds transfers between accounts
- Fixed amount, single-key cash selection from a menu of permissible amounts (fast cash)
- Customized bank transactions
- Institution message identifier
- Financial institution tables (for multi-bank ATM network)
- Transaction chaining
- Encryption/decryption
- 'Cash low' and 'cash out' (cartridge) messages to host
- Printer forms 'low' and 'out' messages to host
- Host interactive response key entry
- Card retract for transaction chaining and customer forgotten cards
- Card capture (retain)
- Ability to change denomination mix (user option and dynamic reconfiguration by 4736)
- Communication Network Management (CNM support)
- Transaction receipt printing
- SNA/SDLC (to host)
- BSC III (to host)
- 4700 BLOOP attachment
- SNA/SDLC attachment 4701 FCS controller (SNA Primary attachment) and 4702 FCS Processor (ALA port)
- Card eject on power failure (returns magnetic stripe card to the user)
- Customization of function keys (masks and overlays)
- Dynamic reconfiguring directly in 4736 upon component failure (customer algorithms)
- IBM safe enclosure on mdl RH2 (UL-291 listed for unattended environments)
- Dual custody IBM safe enclosure
- Alarm grids for IBM safe enclosure on mdl RH2
- Provision to install a thick safe enclosure supplied by OEM safe vendor (mdl R02)
- Large character matrix on display
- Use of preprinted receipt forms for transaction receipts
- Locally stored image and microcode eliminate need to download after power loss or machine reset
- Installation flexibility: free standing, in teller counter, or in interior wall
- Customer setup
- Support for major worldwide currency notes
- Support for major worldwide languages on display and printer
- Statement of Direction
- IBM intends to provide a 3624 emulator for the 4736.

### DESCRIPTION

The 4736 Personal Banking Machine is a self-service cash dispenser which automates a wide range of financial services and teller activities, including cash withdrawal, account balance inquiry, and funds transfers between accounts, as well as other applications which can be implemented by the bank customer. The physically small, 1- or 2-denomination machine may be easily installed in an open area, built into an interior wall, or be installed in a teller counter.

(Canada only > The 4736 is available in two models. <)

(Except Canada > The 4736 is available in three models. <)

### Standard Features:

- Document Feed Module: Each base model contains two document feed modules. The number and mix of notes dispensed

to satisfy a cash withdrawal is under program control. When one currency cartridge is empty or unavailable, the 4736 will automatically reconfigure and feed documents from the remaining currency cartridge to satisfy the withdrawal so long as the remaining cartridge contains the correct note denomination to satisfy the withdrawal request.

Notes will be delivered to the user in a single bundle, containing up to twenty notes.

Currency cartridges are ordered (Except LAD> as accessories <) (LAD only> as CSU Special Features <) and are either electronically locked/unlocked or non-locking and sealable with lead wire or plastic seals. The currency cartridges have a handle for easy carrying. The 4736 will sense low note and empty cartridge conditions and report it to the controlling device.

Reject cartridges are ordered (Except LAD> as accessories <) (LAD only> as CSU Special Features <) The reject cartridges are portable and are either electronically locked or non-locking and sealable exactly like the currency cartridges. A reject cartridge can hold up to approximately 300 notes.

A cartridge loading frame or cartridge loading stand is ordered as an accessory. A cartridge loading frame opens the electronically locked currency and rejected note cartridges. Either a cartridge loading frame or cartridge loading stand positions the non-locking cartridge for proper loading of notes.

- Display: The 4736 display is a 9-inch diagonal monochrome display which has a 480-character capacity (12 lines of 40 characters each).

A limited-angle privacy viewing filter will be provided as a standard feature. Replacement filters can be ordered as accessories. The filter prohibits viewing the display from a side angle, and enhances the user's privacy. The viewing angle is limited to 24 degrees on either side of the center of the screen.

Languages supported by the display include English, western European languages, Chinese, Hangeul, Thai, Hebrew, and Arabic. Large character fonts are used in support of Chinese, Hangeul languages. Support for large character fonts on the 4736 display is provided as standard in the following countries: Korea, Hong Kong, Indonesia, Malaysia, Singapore and Taiwan.

- Identification Card Reader/Encoder: The identification card reader/ encoder on the 4736 will provide for track 1 read, track 2 read, and track 3 read/write. Track 1 will adhere to IATA standards; tracks 2 and 3 will adhere to ABA and ISO standards. The card reader also supports the JUCC (Japanese) magnetic stripe standard.

The card reader ejects a credit card (return to user) upon power failure, and will have a secure, removable card cartridge for holding identification cards which are captured during normal operations.

Customers have the option of having the card inserted either magnetic stripe up or magnetic stripe down (one only). All machines will be shipped with "stripe up" orientation. Conversion from one orientation to the other may be done very easily by the customer in the field.

The card reading mechanism has a lockout device which is ordinarily closed, preventing foreign objects from being inserted into the card reader. The reader recognizes the presence of the magnetic stripe when a card is inserted, and therefore opens the lockout gate. The card, if it is the correct size, is then automatically fed into the reader, and the lockout gate closes for the duration of the transaction.

Under program control, the card reader can retain (capture) a card (not return it to the user). Captured cards are inserted into a locked, removable cartridge as described previously.

Under program control, customers may elect to retain cards forgotten (left in the reader) by the users.

- Transaction Receipt Printer: The Transaction Receipt Printer prints variable length receipts from roll paper. The paper is cut following the printing of the receipt.

The speed of printing is at least 100 cps, and up to 48 characters per line will be printed.

The paper supply is roll paper and the capacity of the roll will be at most, 2,500 3-inch receipts (depends upon paper thickness) 4.5 inches wide. The paper will be furnished as an IBM supply.

Highlighting of characters can be accomplished by means of 'double-dotting'. Such characters will have twice the width of normal characters. The receipt printer has the capability to print in customer selected positions on pre-printed roll paper receipt forms. The ribbon for the receipt printer is made available as an IBM supply, and will be cartridge loading. The ribbon is available in two colors, black and purple.

- Keyboards: 4736 keyboards consist of a combination of an IBM 3624-type function/numeric keyboard and a set of display selection keys, which use the display for prompting. Both sets of keys are provided as standard on the 4736.

The function/numeric keyboard is similar in layout to that of the IBM 3624 CTF, and is in a horizontal position (parallel to the floor) for privacy reasons. It contains a 12-key numeric section. Alphabetic characters can be listed above the numeric characters on the numeric keyboard keytops. In addition to the 10 numeric keys, this section of the keyboard will contain a "decimal point" key and a "date correction" key.

To the right of the numeric key section, will be three keys labeled: "Cancel", "Change" and "O.K."

To the left of the 12-key numeric section, will be up to 16 function keys consisting of up to eight transaction definition keys and up to eight "From/To" keys.

The country code will determine the specific keyboard mask and overlay that is shipped with the machine. Customized overlays and masks will be provided as IBM accessories according to customer specifications.

The display will provide prompting messages for each of the eight display selection keys (four on each side of the display), and the customer can optionally use the display selection keys for making selections in lieu of or in addition to using the function/numeric keyboard.

The contour of the sides of the user console area provides for additional privacy when using the keyboard.

- The RH2 (Except Canada> and R02<) (hardened enclosure versions) have gates at the console level to protect the cash issue and receipt issue areas against the insertion of foreign objects. The design of the 4736 also protects against adverse effects from the spilling of small amounts of liquid on the user console area.

The 4736 mdl RH2 contains a penetration alarm grid with contact pins for interfacing with a security alarm system. The alarm grid protects five sides of the Document Feed Mechanism enclosure. The bottom of the enclosure is not protected by the alarm grid.

The 4736 uses the DES (National Bureau Of Standards) algorithm for encryption and decryption of sensitive information entering and leaving the 4736 on the communications facility.

The 4736 contains a diskette for the storage of systems microcode and images which characterize the operation of the unit.

The 4736 may be serviced from the rear only. An accessory turntable is available to allow the 4736 to be rotated 180 degrees for servicing from the front (mdls RH2 and RS2 only).

## MACHINES

The 4736 continuously monitors its devices to detect abnormal or exception conditions and reports such events to the host via the event message.

If an error is detected during an operation, certain operations are retried a predetermined number of times. If unsuccessful, the function is terminated and the consumer is notified. Recovery may require reconfiguration or service action. All detected errors are logged for use by the institution in service history reporting. Under program control the customer can instruct the 4736 to continue operations even when certain features are not operating.

A provision to accept magnetic striped cards of many different card issuers is supported.

The 4736 can display different languages based on the identifier code recorded on the customer's magnetic stripe card, or based upon consumer selections made via the display. A maximum of four languages can be selected by the customer for any 4736.

**Customer Responsibilities:** The customer is responsible for:

1. Assuring that use of the equipment complies with all Country and local laws, regulations, ordinances, etc.
2. Adequate site, system, and other vendor preparation.
3. Price quotations, installation, and cost (initial and recurring) of common carrier equipment and service.
4. Receipt at customer's receiving dock, unpacking, and placing of the 4736.
5. Physical setup, connection of cables in protected customer-access areas.
6. Make available a currency cartridge and a cartridge loading frame for installation and maintenance.
7. Performing 4736 checkout in accordance with supplied procedures for initial installation or relocation.
8. Creating the customization image and loading it onto the operational diskette.
9. Checking communications with the 4736 Controller or with the host processor.
10. Developing and/or obtaining and installing application programs to communicate with the 4736.
11. Using the problem determination procedures provided with the 4736 to determine the failing component and filling out the appropriate 4736 Trouble Report prior to requesting on-site maintenance service.
12. Notifying IBM of machine relocation for field service coverage.
13. Procuring maintenance service for locks and procurement of any spare or replacement locks.
14. Providing maintenance service for door, hinges and locking mechanisms for hardened enclosure (mdl RH2).
15. Procuring and replacing replacement ink ribbons and paper rolls for the transaction receipt printer. Ink ribbons and paper rolls are available from IBM.
16. Procuring preprinted receipt forms for preprinted receipt forms printer.
17. Procuring any spare or replacement CSU special features or accessories.
18. (LAD only) Procuring non-IBM safe for mdl R02 and making provisions to have mdl R02 installed in non-IBM safe. (<)
19. Procurement and installation/attachment of all non-IBM devices controlled by the External Contact Feature.

20. Procurement and installation/attachment of non-IBM camera and associated equipment controlled by the Camera Interface Feature.
21. Provide application programs to process Diskette Journal data on an IBM PC/AT (or compatible device).
22. Provide wire or plastic seals for use with the new Currency and Rejected Note Cartridges.

### Publications:

- GC31-0046 IBM 4736 Personal Banking Machine General Information Manual
- GC31-0060 IBM 4736 Personal Banking Machine Planning and Site Preparation Guide
- GX31-4507 IBM 4736 Personal Banking Machine Physical Planning Template

### Recommendations For Efficient Operation:

- Keep Spare Currency Cartridges: Currency cartridges for use in the 4736 and spare or replacement currency cartridges may be ordered from IBM. Spare cartridges permit the customer to have cartridges replenished without having to interrupt service for extended periods of time. The service document cartridge and a cartridge loading frame must be made available to the field service personnel whenever a service call is made.
- Use New or Used Currency in Good Condition: The general condition of used currency may vary. Used currency must be inspected to remove excessively worn, damaged, or torn notes. The "IBM 4736 Personal Banking Machine Operator's Guide", GC31-0051, contains procedures for preparation of new currency and inspection of used currency for operation in the 4736.

**Maintenance:** Maintenance of the 4736 is available under the IBM Maintenance Agreement.

IBM will not provide warranty or maintenance service on a 4736 containing money. The customer will be responsible for removing, controlling, and reloading all money in the 4736 so that IBM can fulfill its warranty and maintenance obligations.

Customers with 4736s not covered by IBM Maintenance Agreements may have the unit(s) repaired, if reparable, on-site for a time and material charge.

If maintenance coverage is not contracted for immediately following expiration of any warranty, and the customer subsequently wants IBM Maintenance Agreement coverage, the customer must first have the machine(s) inspected so that eligibility for maintenance coverage may be determined. This qualification will be done at the customer's site.

If a unit requires repair and the repair is requested, all parts needed are billed at IBM's prevailing parts prices and the additional time required for repairs is billed at IBM's applicable service rates. The machine then becomes eligible for IBM Maintenance Agreement Coverage.

IBM does not maintain locks (either key or combination locks), or the door, hinges or locking mechanism of the hardened enclosure (mdl RH2).

**Customization:** The enclosure of the 4736, as shipped, will be finished in pearl white. The optional front panel accessory, below the user console, may be removed for custom painting by the customer. Also, the customer may use a custom panel in place of that supplied as an IBM accessory.

### Specify Options:

- Machine Designation: Primary and secondary machine designation is required to control distribution of the 4736 microcode updates. Specify #9491 or #9492 as follows:
  - Primary Machine (#9491). Indicates microcode updates are to be shipped to the machine location.

- Secondary Machine (#9492). Indicates no microcode updates are to be shipped for this machine.

- At order time for the 4736, one of the following must be specified:

Document Reject Cartridge Electronic-Locking #9000  
Document Reject Cartridge Non-Locking #9001

- Power configuration will be determined by country code.
- A standard keyboard overlay and mask will be provided as determined by the country code. Additional standard mask and overlays may be ordered (Except LAD>as accessories.<) (LAD only>as CSU Special Features.<) Custom masks and overlays may be obtained via RPQ. IBM 3624 CTF and IBM 4730 Personal Banking Machine keyboard overlays

and masks can be used with the 4736 provided their function is consistent with that of the 4736.

### Capacities:

- Transaction receipt printer: Approximately 2,500 3-inch long receipts of 16-pound paper.
- Currency cartridge: 2,050 new U.S. notes, or equivalent.
- Currency rejected note cartridge: 300 U.S. notes, or equivalent.
- Identification card capture cartridge: 30 cards.

**Currencies/Denominations:** IBM intends to support major world-wide currencies on the 4736. To-date, the following currencies have been tested and are supported:

Country	Denominations	Quality of Note Supported	Mint Used	Comments Restrictions
Argentina	1, 10 Austral	Yes	-	
Australia	5, 10, 20 Dollar	Yes	Yes	Facing Restriction for Mint Notes.
Canada	5, 10, 20 Dollar	Yes	Yes	
Chile	500, 1,000 Peso	Yes	Yes	
Colombia	500, 1,000 Peso	Yes	Yes	
Costa Rica	500 Colones	Yes	Yes	
Ecuador	100, 1,000 Sucres	Yes	Yes	
Guatemala	5, 10 Quetzales	Yes	Yes	
Hong Kong	10, 100 Dollar (SCB)	Yes	Yes	1985 Issue, Only.
Hong Kong	100 Dollar (HKSH)	Yes	Yes	1985 Issue, Only.
Indonesia	1,000, 10,000 Rupiah	Yes	Yes	
Korea	1,000, 10,000 Won	Yes	Yes	
Malaysia	10, 50 Dollar	-	Yes	
Mexico	1,000, 5,000 Peso	Yes	Yes	
New Zealand	5, 10, 20 Dollar	Yes	Yes	
Peru	50,000 Soles	-	Yes	
Peru	100 Intis	Yes	Yes	
Singapore	10, 50 Dollar	Yes	Yes	
Thailand	100, 500 Baht	-	Yes	
Uruguay	1,000 New Peso	Yes	Yes	
Venezuela	50, 100 Bolivar	Yes	Yes	

IBM will periodically announce support for additional currencies supported.

Banking Machine Remote Network Monitor program (see below) will transmit the image from 4701 or 4702 to the 4736.

### PROGRAMMING SUPPORT

The 4736 will be supported by the following program products:

- IBM 4730 Customization Image Builder (5668-870) Release 2: This program will operate in a S/370, 30XX and 43XX Processor to allow customers to create and/or modify a customization image for the 4736. The 4736 image defines such options as currency denominations to be dispensed, wording and formatting of display screens and printed user receipts, and all other characteristics required to operate the 4736.

The program will be distributed on magnetic tape along with a sample 4736 image.

The customer will use available full-screen host editor programs to create/modify 4736 images for his own use.

The IBM 4700 Finance Communication System Host Support Program (5688-989) Release 5 Modification Level 1 or later will contain facilities to store and manage the customized image file and transmit it to the 4736. If an intermediate IBM 4700 Finance Communication System is used, the IBM 4730 Personal

- IBM 4730 Personal Banking Machine Network Monitor (5668-871) Release 2: This program will operate on S/370 processors, the 30XX and 43XX processors, and provides monitoring and control functions for a network of 4736 machines. The program maintains a record of the status of each 4736, and provides control of 4736 operations. It operates interactively as either a CICS or IMS application program using online data files for the 4736 status data collection.

Some of the tasks associated with monitoring and controlling the 4736 network are:

- Initialization and startup procedures to open the 4736 for business.
- Recovery action to re-open a 4736 after certain closures, such as for servicing or as a result of communication failure.
- Logging events such as status changes of the 4736 and its components, and alerting the network operator of situations which require attention. Examples include device failure on the 4736, "low" note or "out of" note levels for currency cartridges, and supplies that need replenishing.
- Periodic changes of communication encryption keys.
- The program supports the use of color displays and online printers for network monitoring and control.

- IBM 4730 Personal Banking Machine Availability Management-Batch Reporting Program (5668-873) Release 2: This program runs in a batch mode on VSE or OS/VS systems. It creates reports by processing 4736 events and command response collected by the IBM 4730 Personal Banking Machine Network Monitor or a similar application program. Availability Management-Batch Reporting produces two types of reports: Network reports which list the 4736s in the network along with statistical information enabling the customer to compare the performance of one 4736 with the performance of others; workstation reports which provide detailed information about a specific 4736.

The network reports provide an overview of the network performance; the workstation reports provide details used for problem resolution. Release 2.0 of the IBM 4730 Personal Banking Machine Availability Management-Batch Reporting, adds support for the 4736 Personal Banking Machine and its associated features. New report functions support multiple 4736 operational time frames, (including holidays); provide additional operational availability data; sequencing by machine type, controller and institution; and offer enhanced facilities for controller attached 4736s.

Supports definition of multiple 4736 operational time frames (including holidays). Enhances Availability Report information. Enhances support for controller attached 4736s. Provides additional report options, loads all error log, event, command responses and statistical counter descriptions from a table thereby allowing for addition and deletion of message descriptions. Enhances Availability Report information.

- IBM 4730 Personal Banking Machine Remote Network Monitor (5668-872) Release 1: This program, which runs in a 4701 Controller or a 4702 Branch Processor, provides the 4736 device control support and assists the customer in monitoring and controlling a small network of 4736 machines attached to the controller or branch processor. The 4736 machines would be attached either via the BLOOP or SNA primary (SNAP) attachment feature. PBMRNM is an RM4700 based program and provides 4736 device support/control.

Any additional institution financial application/transaction code will be supplied by the 4736 customer.

### SPECIAL FEATURES

Specify one of the following on each order:

- SNA/SDLC Communication #3005
- 4700 Bloop Attachment #3010
- BSC III Communications #3035

**SNA/SDLC Communications (#3005):** With this feature, SNA/SDLC attachment is provided as follows.

A 12m (40 ft) cable assembly will be provided for remote attachment of the 4736 to a 4701 Controller, or to a 4321/4331 Communications Adapter, or to an IBM System/370, 303X, 308X or 309X via an IBM Communications Adapter (e.g., 3704, 3705, 3725, 3726).

**Note:** For remote attachment to the 4701 Controller, the EIA/CCITT Interface (#3701), and the SDLC Communications Adapter Without Business Machine Clocking (#4502), are required on the 4701. For remote attachment to the 4702 Processor, the Alternate Line Attachment Port (#3702) and the SDLC RS-232-C Interface (#9645) is required on the 4702. Supported transmission rates for remote SNA/SDLC communications are 1200, 2400, 4800, and 9600 bps. This attachment requires an IBM modem or equivalent. (See table below.)

This feature also supports local SNA/SDLC attachment to a 4701 Controller or a 4702 Processor. The Fanout Communications Adapter (#1551) and the SDLC Communications Adapter Without Business Machine Clocking (#4502) be installed on the 4701. The Alternate Line Attachment Port (#3702) and the Communications Interface (#9646) must be installed on the 4702. Supported trans-

mission rates are 2400 bps (122m, 400 ft, maximum cable length), 4800 bps (61m, 200 ft, maximum cable length), and 9600 bps (30m, 100 ft, maximum cable length).

This feature is field installable.

**4700 BLOOP Attachment (#3010):** This feature will allow the 4736 to be attached locally or remotely to a 4701 Controller or to a 4702 Branch Processor. For local BLOOP attachment, the customer will be instructed to provide the appropriate attachment cable (see "IBM 4736 Planning and Site Preparation Guide", GC31-0060). Included with this feature, is a 12m (40 ft) cable which will support attachment of the 4736 to an external modem for remote BLOOP communication.

If the 4736 is attached remotely to a 4701 Controller or a 4702 Branch Processor, an IBM modem or the equivalent is required. (See table below.)

This feature is field installable.

**BSC III Communications (#3035):** This feature supports Binary Synchronous multi-point, polled, line protocol at line speeds of 1200, 2400, and 4800 bps rates. The 4736 will recognize the BTAM BSC3 implementation and the BTAM BSC3 3276 display device implementation with EBCDIC or USASCII transmission code. This attachment requires an IBM modem or equivalent. (See table below.) This feature is field installable.

Modems	Speed (bps)	Lines
-----	-----	-----
3603-1	1200	Nonswitched
3603-2	2400/1200	
3833-1	2400	Nonsw voice grade
3834-1	4800	Nonsw voice grade
3863-1,2	2400/1200	Nonsw or Sw voice grade
3864-1,2	4800/2400	Nonsw or Sw voice grade
3865-1,2	9600/4800	Nonsw voice grade
3868-1	2400/1200	Nonsw voice grade
3868-2	4800/2400	Nonsw voice grade
3868-3,4	9600/4800	Nonsw voice grade
3872-1	2400/1200	Nonsw or Sw voice grade
3872-1(1)	2400/1200	Nonsw or Sw voice grade
3976-3	1200/600	Nonsw or Sw voice grade
5811-10	2400 to 9600	Limited distance modem
5811-18		Rack mount version of 5811-10
5811-20	2400 to 9600	Nonsw baseband
5811-28		Rack mount version of 5811-20
5812-10	2400 to 9600	Nonsw baseband
5812-18		Rack mount version of 5812-10
5865-2,3	9600/7200/4800	Nonsw voice grade
5868-52		Rack mount version of 5865-1, 2

(1) Canada only

**Note:** 4-wire Switched Network Back-up is available on 3863, 3864, 3865, 5865 and 5866 modems with feature #7953 installed. 2-wire Switched Network Back-up is available on 5865 and 5866 modems with feature #7952 installed. See your TCM branch / TP coordinator for country limitations.

**External Contacts (#3060):** This feature will provide seven external contacts which will allow the customer to attach and control non-IBM devices. The functions of the contacts are as follows:

- "Open" Contact: This contact closes when the 4736 is available to process user (financial institution customer) transactions.
- "Closed" Contact: This contact closes when the 4736 is not available to process user transactions.
- "Intervention Required" Contact: This contact closes whenever the 4736 requires a financial institution operator to open the back door of the 4736.
- "Card Entry" Contacts #1, #2, and #3: These three contacts are controlled in parallel and are closed when a magnetic striped card is accepted in the 4736. These contacts will remain closed until the card is removed from the 4736 and the transaction completed.
- "Door Open" Contact: This contact closes when the door to the lower enclosure is open.

This feature is field installable.

## CUSTOMER SETUP (CSU) SPECIAL FEATURES

CSU Special Features may be ordered via MES for installation on installed machines.

**IBM 3624 Emulator (#3045):** The 3624 Emulator Feature will support both IBM 3624 version 7 and 3624 version 8 protocols and functions. The existing IBM S/370 or 4700 applications for the IBM 3624 will run with minimal changes. The 4700 CPGEN will have to be modified to define the 4736. Attachment of an 4736 to the 3600 is not supported.

All IBM 3624 functions will be supported with the following exceptions:

- Host Interactive mode.
- JUCCL.
- CHANGE DISPLAY MESSAGE command and CHANGE PAGE/SEGMENT command (these commands will be accepted by the 4736, but no data will be changed).
- Functions which require capability not available on the IBM 4736 (e.g., deposit acceptance).
- MM data will not be passed to the host.
- 3624 journal commands will cause the 3624 Emulator to write journal records to the 4736 system diskette. These diskette records can be read by a PC-AT.

Error Log Data, created by a failure which causes a 4736 closure or dynamic reconfiguration, is available to the host application programs.

Only the following IBM 3624 communications methods are supported:

- SNA/SDLC using an LU-0 interface (9600 bps maximum)
- B-LOOP attachment to the IBM 4701/4702

Teller/CE Services:

- Existing 4736 teller servicing operations, as well as CE diagnostics and operations are supported as in 4736 native mode. The CE diagnostics will reside on a separate diskette.

Additional IBM 4736 Unique Functions Supported:

- 480-character display and associated keys
- IBM 4736 receipt printer
- Track 1
- IBM 4736 language support
- Large character support
- ID card return at power outage
- Cash retract and "close" option
- IBM 4736 external contacts

Currency Support:

- Currency previously announced for the 4736 is supported.

IBM 3624 RPQs Supported:

- IBM 3624 keyboard overlay/keyboard mask (unless the RPQ requires a 3624 function that is not available on the 4736 (e.g., functions requiring a depository).
- Currency RPQs - Unless the currency is already supported on the 4736, 3624 currency RPQs must be submitted for approval on the 4736.
- RPQs providing 3624 function beyond that provided in the base version 7 and version 8 3624s are not supported.

Image Creation:

- The 3624 Emulator program requires a unique 4736 image (a sample object image will be provided with the 3624 Emulator Feature). The image can be created/modified by the Customization Image Builder or an equivalent product.
- For direct attached 4736s, the 4700 Finance Communication System Host Support (licensed program 5668-989) or the equivalent can be used to download the image to the 4736.
- For controller attached 4736s, the image can be delivered to the 4736 by:

1. Transmission to PC/AT diskette (or equivalent) and manual loading of a diskette into each 4736.
2. Transmission to customer-written 4700 user program by 4700 Host Support (or equivalent). The 4700 user program must then transmit the image to the 4736.

**Camera Interface (#3050):** The 4736 Camera Interface CSU Special Feature will provide to a non-IBM camera, signals to allow the non-IBM camera to be triggered at specific points in the 4736 transaction sequence. ASCII Data will be supplied to the non-IBM camera to allow capture of time, date, transaction sequence number, IBM 4736 machine identifier and a code defining the step in the transaction sequence at which the specific frame was captured. Additional alphanumeric data can optionally be supplied to the non-IBM camera by the host computer application program.

The Camera Interface will receive the following status from the non-IBM camera, if provided, and pass them on to the host application:

- Low media (film, videotape)
- Out of media
- Camera unavailable

**Diskette Journal (#3055):** The Diskette Journal CSU Special Feature provides a second diskette drive in the 4736. All financial transactions attempted on the 4736 are written to the Diskette Journal. All transaction records and transaction responses are journaled. Journaling will take place for both successful and unsuccessful transactions.

Diskette Journal capacity is at least 1,500 transactions. Each diskette has a capacity of 1.2 Megabytes.

The contents of the diskette can be displayed or printed using an IBM PC/AT (or compatible device). A sample PC/AT program is provided to assist the user in writing an application program to satisfy user requirements.

When the diskette is full, the user can optionally cause the 4736 either to close or to suspend use of the Diskette Journal Feature.

(LAD only) The 4736 will be shipped with one currency rejected note cartridge, one identification card retain cartridge, one standard keyboard overlay, and one standard keyboard mask. Replacement CSU Special Features and spares may be ordered from IBM. No currency cartridges are shipped with base models and must be ordered separately as CSU Special Features. A cartridge loading frame accessory is required to open the electronically locked currency and rejected note cartridges. Either the cartridge loading frame accessory or the cartridge loading stand accessory may be used to properly load the non-locking currency cartridges.

Currency Cartridges

Electronic	Non-
Lock/Unlock	Locking
	Sealable

## MACHINES

Country	P/N	P/N(<)	Portuguese	945429	4520479
			Spanish	2335315	4520479
			US English		
			(US only)	6937641	4520485<)
(LAD only>					
Argentina	1	56X1445	56X1764		
Argentina	10	56X1446	56X1765		
Chile	500	56X1447	56X1785		
Chile	1,000	56X1448	56X1786		
Colombia	500	56X1449	56X1787		
Colombia	1,000	56X1450	56X1788		
Costa Rica	500	56X1517	56X1907		
Ecuador	100	56X1499	56X1794		
Ecuador	1,000	56X1501	56X1796		
Guatemala	5	56X1514	56X1904		
Guatemala	10	56X1515	56X1905		
Mexico	1,000	56X1460	56X1835		
Mexico	5,000	56X1516	56X1906		
Peru	100	56X1518	56X1908		
Peru	50,000	56X1477	56X1848		
Panama	1	56X1406	56X1891		
Panama	5	56X1407	56X1892		
Panama	10	56X1408	56X1893		
Panama	20	56X1409	56X1894		
Panama	50	56X1410	56X1895		
Uruguay	1,000	56X1519	56X1909		
Venezuela	50	56X1470	56X1897		
Venezuela	100	56X1471	56X1898<)		

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

(Except LAD> The 4736 will be shipped with one currency rejected note cartridge, one identification card retain cartridge, one display privacy filter, one standard keyboard overlay, and one standard keyboard mask. Replacement accessories and spares may be ordered from IBM. No currency cartridges are shipped with base models and must be ordered as accessories. A cartridge loading frame accessory is required to open the electronically locked currency and rejected note cartridges. Either the cartridge loading frame accessory or the cartridge loading stand accessory may be used to properly load the non-locking currency cartridge.

The following accessories can be ordered from IBM:

- Document cartridge loading stand - P/N 56X1550
- Turntable for front service - P/N 6937554
- Display Privacy Filter - P/N 6411272
- Card Retain Cartridge - P/N 6328188
- Front Decorative Panel and Kick Strip - P/N 6411211<)
- (Canada only> Rejected Note Cartridge: Electronically Locked - P/N 56X0887, Non-Locking - P/N 56X1750<)
- (APG only> Rejected Note Cartridge: Electronically Locked - 56X0890, Non-Locking - 56X1757<)

## Currency Cartridges:

	Electronic Lock/Unlock	Non-Locking Sealable
COUNTRY	P/N	P/N(<)
(LAD only>		
	56X0890	56X1757<)

## (LAD only> Card Retain Cartridge

Country	P/N
All	6328188

## Cartridge Loading Frame

Country	P/N(<)
(LAD only>	
Argentina	6465117
Chile	6465118
Colombia	6465119
Costa Rica	6465119
Ecuador	6465119
Guatemala	6465122
Mexico	6465124
Panama	6465108
Peru	6465117
Uruguay	6465000
Venezuela	6465130<)

## (LAD only> Document Cartridge Loading Stand

Country	P/N
All	56X1550

## Keyboard Overlays and Masks

Language	Overlay P/N	Mask P/N
----------	-------------	----------

Country	P/N	P/N
(Canada only>		
Canada	5	56X1414
Canada	10	56X1415
Canada	20	56X1416
(APG only>		
Australia	5	56X1429
Australia	10	56X1430
Australia	20	56X1431
Hong Kong(SCB)	10	56X1451
Hong Kong(SCB)	100	56X1452
HKSH	100	56X1452
Indonesia	1,000	56X1453
Indonesia	10,000	56X1454
Korea	1,000	56X1455
Korea	10,000	56X1456
Malaysia	10	56X1457
Malaysia	50	56X1458
New Zealand	5	56X1461
New Zealand	10	56X1462
New Zealand	20	56X1463
Singapore	10	56X1464
Singapore	50	56X1465
Thailand	100	56X1468
Thailand	500	56X1469

## (Except LAD> Cartridge Loading Frame

Country	P/N(<)
(Canada Only>	
Canada	6464912<)
(APG only>	
Australia	6464692

Hong Kong	6465120
Indonesia	6465121
Korea	6465122
Malaysia	6464848
New Zealand	6465125
Singapore	6465127
Thailand	6465129<)

(Except LAD> Document Cartridge Loading Stand:

Country	P/N
All	56X1550

**Keyboard Overlays and Masks:**

Language	Overlay P/N	Mask P/N<)
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(Canada Only>  
Canadian English

**MACHINES**

(Canada only)	2335299	4520479
Canadian French	2336118	4520479<)

(LAD only> The following accessories can be ordered from IBM:

- Document Cartridge Loading Stand - P/N 56X1550
- Turntable for front service - P/N 6937554
- Display Privacy Filter - P/N 6411272
- Front Decorative Panel and Kick Strip - P/N 6411211 <)

**SUPPLIES**

The following starter set of supplies will also be shipped with each 4736, and additional quantities may be ordered from IBM: Receipt Printer ink ribbon and Receipt Printer paper (if Receipt Printer special feature is ordered), card reader head cleaning cards, and card reader test cards.

The following supplies can be ordered from IBM:

- Purple Printer Ribbon - P/N 7033537
- Black Printer Ribbon - P/N 7037985
- Printer Paper Roll (12 Rolls per Box) - P/N 6064298

## 4860 PCjr

### PURPOSE

The 4860 PCjr is a small, low-cost system which is compatible with other members of the IBM Personal Computer family. PCjr is designed for use in home and educational environments and for personal productivity applications.

### MODELS

**Model 004:** System Unit/Keyboard, 64KB Memory, two cartridge slots, transformer.

**Model 067:** System Unit/Keyboard, 128KB Memory (including 64KB memory and display expansion), two cartridge slots, transformer, one 360KB Diskette Drive.

**Prerequisites:** One of the following display options is required: A) an Adapter Cable for IBM Color Display (#0021) and a 5153 mdl 001 Color Display or equivalent, or B) a Connector for TV (#0020) and a user-supplied color television set, or C) a user-supplied color video monitor and cable. Four user-supplied AA-size batteries are required to operate the cordless keyboard. The optional Keyboard Cord (#0012) is required to operate the keyboard without batteries. The use of the 360KB Diskette Drive requires IBM Personal Computer Disk Operating System (DOS) Version 2.1 (6024120) or higher.

**Customer Setup (CSU):** All mdls and special features of the 4860 PCjr are customer setup.

### HIGHLIGHTS

- The 4860 PCjr base system consists of three separate units: The system unit, a cordless keyboard, and a small power transformer. The optional keyboard cord and the transformer plug into rear-mounted jacks on the system unit. The system unit includes 64KB of Read-Only Memory (ROM), which contains the power-on self-test, Cassette BASIC interpreter, and cassette operating system.
- The Cassette BASIC interpreter provides the necessary cassette input/output instructions and a high level of support for display, keyboard, printer, light-pen, and joy sticks, as well as a full complement of editing, logic, math, and string functions. It is operational as soon as the system is turned on.
- The cordless keyboard, with a technology that is unique to the PCjr, is a low-profile, 62-key, detached keyboard that allows low cost and high quality. The keys are arranged in standard typewriter layout with the addition of a function key and cursor control keys. The keytops themselves are not labeled. The standard keyboard layout is permanently affixed above each key. This allows customization of the entire keyboard. There are two tilt positions for operator comfort: The normal position has 5-degree slope; with legs extended it has a 12-degree slope.
- The cordless keyboard is battery-powered and interfaces with the system unit by an infrared (IR) optical link. Mounted in the keyboard are two infrared emitting diodes that transmit coded information to the system unit. The receiver card, located in the system unit, has an infrared sensing device that receives the signal transmitted from the keyboard. The keyboard is powered by four customer-supplied AA-size batteries during cordless operation. It will function in cordless mode when located within 20 feet of, and in front of, the PCjr.
- An optional keyboard cord connection to the system unit is available power the keyboard and to send data to the system unit. The cord option must be used when multiple systems are being operated in the same immediate area to eliminate cross communication.

- The following items are supplied as standard with the 4860 PCjr system unit:

- 62-key cordless keyboard battery-powered infrared optical link operation within 20 feet of and in front of system unit
- 64KB of read-only memory (ROM) 250ns access time; 375ns cycle time; Cassette BASIC interpreter; Power-on self-test; Cassette operating system
- 64KB (mdl 004) random access memory, 128KB (mdl 067) random access memory (16KB reserved for video buffer)
- 360KB Diskette Drive (mdl 067 only)
- Intel 8088 microprocessor 4.77 MHz clock (210ns clock-cycle time)
- Two cartridge slots
- 60-volt-ampere step-down power transformer Separately housed; Weight: 2 lb 13 oz.; Power cord: 6 feet from power source to transformer; 4 feet from transformer to system unit
- 33-watt, 3-voltage-level, 2-stage power supply
- Audible alarm
- Sound subsystem that uses the speaker(s) in TV or display
- I/O connectors, keyed to prevent improper installation, for the following devices and options:

- ▲ Serial Devices
- ▲ Cassette recorder for loading or saving programs or data
- ▲ Joy sticks
- ▲ Modem
- ▲ Diskette
- ▲ Video/graphics subsystem
- ▲ Direct-drive video, composite video, and television
- ▲ Light-pen
- ▲ I/O expansion bus
- ▲ External audio

- Options for the 4860 PCjr that attach to the I/O connectors are:

- 360KB diskette drive for mdl 004 (standard on mdl 067)
- 64KB memory and display expansion for mdl 4 (standard on mdl 067)
- Internal modem
- Parallel printer attachment
- Keyboard cord
- Adapter cable for IBM Color Display
- Adapter cable for cassette
- Adapter cable for serial devices
- Connector for TV (RF modulator)
- Joy sticks

In addition, a carrying case and cordless keyboard overlays are available.

### Physical Specifications (system unit):

Width - 354mm (13.9 in)  
Depth - 290mm (11.4 in)  
Height - 97mm (3.8 in)  
Weight - less than 9 pounds with diskette drive; less than 6 pounds without diskette drive

### Physical Specifications (keyboard):

Width - 342mm (13.5 in)  
Depth - 168mm (6.6 in)  
Height - 26mm (1.02 in)



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M 4860.2  
DEC 86

Weight - 616 grams (22 oz.) without batteries; 700 grams (25 oz.) with batteries

#### Operating Environment:

Temperature (system on): 16 to 32 degrees C (60 to 90 deg. F)  
Temperature (system off): 10 to 43 degrees C (50 to 110 deg. F)  
Temperature (storage): 0.6 to 60 degrees C (33 to 140 deg. F)  
Temperature (shipment): -40 to 60 degrees C (-40 to 140 deg. F)  
Relative Humidity (system on): 8% to 80% RH  
Relative Humidity (system off): - 8% to 80% RH  
Transformer operating: Altitude to 7,000 feet.

**Warranty Service:** Provided under the Agreement for Purchase of IBM Machines as amended by the Amendment for IBM Service/Exchange Center Services. Such service is provided, at no additional charge, under the Customer Carry-In Repair offering. The warranty period is one year. Machines installed on or prior to August 31, 1984 and that do not have the Power Expansion Attachment, the Speech Attachment or the 128K Memory Expansion Attachment installed will still have Customer Carry-In Exchange at the warranty service offering. The warranty offering for IBM PCjr System Unit installed on or prior to August 31, 1984 that do have the Power Expansion Attachment, the Speech Attachment or the 128K Memory Expansion Attachment installed is Customer Carry-In Repair. The customer may select for a fee a warranty option for IBM On-Site Repair service to be provided during the one-year warranty period.

**Warranty Options:** An Option which entitles the customer to service provided under the IBM On-Site Exchange Offering during the warranty period. An Option which entitles the customer to service provided under the Customer On-Site Exchange Offering during the Warranty period. Optional Periods of Maintenance Service are not available for this product.

#### Publications

- "Logo: Programming with Turtle Graphics" (#2229): A spiral-bound manual that explains how to construct programs using Logo and includes a step-by-step introduction to Logo turtle graphics. The manual is intended for use with IBM Logo (6024076), and is identical to the manual that is shipped with the software.
- "Hands-on BASIC for the IBM PCjr" (#2290): This manual is provided as standard with all mdls of the 4860 system unit. The manual is a primer for learning BASIC language programming. The manual may be purchased separately by ordering feature #2290.
- "IBM PCjr Guide to Operations" (#2292): Provides information on operations for users of the 4860 PCjr. This manual is shipped as standard with all mdls of the 4860 system unit. The manual may be purchased separately by ordering feature #2292.
- "IBM PCjr Technical Reference Manual" (#2293): This manual is designed to provide hardware design and interface information. The manual is intended for programmers, engineers involved in hardware and software design, designers, and interested persons who have a need-to-know how the 4860 PCjr is designed and works.
- "IBM PCjr Hardware, Maintenance, and Service Manual" (#2294): Provides step-by-step instructions that aid the user in identifying the failure of a 4860 PCjr Field Replaceable Unit (FRU). When the FRU has been identified, the manual provides the necessary information to complete the repair activity (i.e., adjustments, replacements, etc.).
- "BASIC Made Easy for the IBM PCjr" (#4116): An introduction to the BASIC programming language on the 4860 PCjr. It takes inexperienced users of the 4860 PCjr and the BASIC programming language through the more commonly used commands, statements, and functions of BASIC. The student learns by doing, and sets his or her own pace. The book is written in a friendly, conversational tone with heavy emphasis on the use of color, sound, and examples. Once the student has completed BASIC Made Easy, it can be used as a reference book, since it contains a list of common BASIC error messages, as well as an index of BASIC programming terms. Prerequisites: Before beginning "BASIC Made Easy", the user should read the "IBM PCjr Guide to Operations" to become familiar with the keyboard. To enter examples shown in the text requires a 4860 PCjr with the BASIC Interpreter cartridge (#4101), and one of the following: A) a color TV set with the connector for TV (#0020); or, B) a color video monitor with cable.
- "IBM Personal Computer Disk Operating System (DOS) 2.1 Technical Reference" (#4125): Intended for the more experienced DOS users, system programmers, and those who will be developing their own applications. It contains detailed technical information not contained in the manuals available with DOS 2.1 (6024120).
- "IBM PCjr BASIC Reference Manual" (#4702): This manual (which is provided as standard with the BASIC Interpreter cartridge #4101) describes the full capabilities of cassette and cartridge BASIC. The manual may be purchased separately without a cartridge by ordering feature #4072.

#### SPECIFY

- Voltage (110V AC, 60 Hz): No specify required.

#### MODEL CONVERSIONS (NONE)

#### SPECIAL FEATURES

**Diskette Drive (#0005):** The Diskette Drive is a standard feature on the 4860 mdl 067. It provides for the 4860 to read and write data on both sides of a double-sided, soft-sectored 5-1/4 inch diskette. Each side of a diskette can be formatted for 40 tracks with 9 sectors per track. Formatted storage capacity is approximately 360KB. Space and power have been provided for one drive in the system unit. Included with the Diskette Drive is the diskette drive adapter which connects to the diskette drive through an internal, flat cable attached to one end of the adapter. The diskette drive parameters are programmable. In addition, the attachment supports the diskette drive's write-protect feature. The adapter is buffered on the I/O bus and uses the system read-only memory BIOS (basic input/output system). Diskettes created on any member of the IBM Personal Computer family may be read on any other member of the family. Technical Information: 512 bytes/sector --- 9 sectors/track --- 48 tracks/in. track density --- 2 sides --- 40 tracks per side (80 total) --- 300 RPM --- 6ms track to track access time --- 250K bits/sec data transfer rate --- maximum operating altitude 7,000 feet above sea level --- dimensions -- height, 41.6mm (1.6 in.); width, 146mm (5.8 in.); depth, 208mm (8.3 in.); weight, 1.1kg (2.2 lbs). Maximum: One. Field Installation: Yes. Prerequisites: 4860 mdl 004. IBM Personal Computer DOS 2.1 (6024120) is required. It is recommended that the 64KB Memory and Display Expansion (#0007) be installed on diskette-based systems. Customer Setup: Yes.

**Power Expansion Attachment (#0006):** The Power Expansion Attachment feature consists of a side-attached power supply module and a stand-alone 56-volt/ampere stepdown transformer unit. The power supply module provides an additional 20 watts of power and attaches to the right side of the 4860 System Unit via four screws. When installed in a 4860 configuration, this feature must be the first side-attached feature installed. The power supply module is 32mm (1.26 in.) deep, 290mm (11.42 in.) wide, and 96.5mm (3.8 in.) high. The transformer attaches to the back of the power supply module via its attached cable and plugs into an electrical outlet via its attached power cord.

This feature provides additional power for a 4860 configuration, permitting any combination of up to three of the following side-attached features to be connected to the side of the 4860 unit after installation of the Power Expansion Attachment:

- 128Kb Memory Expansion Attachment (three maximum)

- Parallel Printer Attachment (one maximum)
- Cluster Attachment (one maximum)
- Speech Attachment (one maximum)

One 128Kb Memory Expansion Attachment, one Parallel Printer Attachment, or one Speech Attachment feature can be attached to any 4860 unit without installation of the Power Expansion Attachment feature. In Addition, one Cluster Attachment can be attached to a 4860 Model 4 that does not have a diskette drive, Parallel Printer Attachment, or 128Kb Memory Expansion Attachment installed.

The Power Expansion Attachment feature is required for the following:

- To attach two or three of the other optional side-attached features (128Kb Memory Expansion Attachment, Parallel Printer Attachment, Cluster Attachment, and Speech Attachment)
- To attach the Cluster Attachment to any 4860 Model 67 (which has a standard diskette drive) or to a 4860 Model 4 to which a diskette drive has been added.

**64KB Memory and Display Expansion (#0007):** The 64KB Memory and Display Expansion is a standard feature on the 4860 mdl 067. This option permits the use of higher density video modes and 80-column text support while increasing the system memory size by 64KB for a total of 128KB (including 16KB video buffer). The option is a shielded adapter card containing eight 64K-by-1, 150ns, dynamic memory modules which plugs into a 44-pin connector on the system board. Parity checking is not supported. The memory and display expansion does not require the user to reconfigure the system to recognize the additional memory. Maximum: One. Field Installation: Yes. Prerequisites: 4860 mdl 004. Customer Setup: Yes.

**Internal Modem (#0008):** Provides for full-duplex asynchronous communication over 2-wire, switched network channels (normal household telephone installation). The Internal Modem plugs into the modem connector on the system board and does not require the use of the system unit serial port. Auto/manual answer --- auto/manual originate --- direct connection to telephone line uses modular phone jack (USOC RJ11) - modem cable is included --- auto dial Touch-tone\* (\* Touch-tone is a trademark of AT&T) or pulse by software command --- compatible with Bell 103 series modems --- call progress reporting --- dial tone, ring-back tone, and busy-tone detection --- fully programmable serial-interface characteristics: 7- or 8-bit characters; even-, odd-, or no-parity bit generation and detection; one stop-bit generation; baud rate generation (110 bps or 300 bps); false start-bit detection --- complete status reporting capabilities --- line-break detection --- internal diagnostic capabilities: loopback controls for communications link fault isolation; break, parity, overrun, framing error simulation --- fully-prioritized interrupt system controls. Maximum: One. Field Installation: Yes. Prerequisites: Customer-provided modular telephone jack connected to the telephone system. Customer Setup: Yes.

**Parallel Printer Attachment (#0009):** Supports attachment of the 5152 mdl 002 Graphics Printer or equivalent. Attaches to the I/O bus on the right side of the system unit and presents the I/O bus at its right side for additional attachments. Dimensions: Height 76mm (3 in.); length 244mm (9.6 in.); weight 12 oz. Maximum: One. Field Installation: Yes. Prerequisites: Printer cable (#5612) is required for attachment of a printer. Limitations: When the Parallel Printer Attachment is present, the 4860 PCjr directs print output only to this attachment. Customer Setup: Yes.

**Attachable Joy Stick (#0010):** This option is an input device which provides the user with 2-dimensional positioning control. Two momentary contact pushbutton switches on the joy stick give the user additional input capability. Two modes of operation are available. In the "spring return" mode, the stick will return to the center position when released. The "free floating" mode allows smooth, force-free operation with the stick remaining in position when released. Selection of these modes can be made for each axis independently. Two controls are provided for individual adjustment to the electrical center of each axis. Maximum: Two. Field Installation: Yes. Customer Setup: Yes.

**Keyboard Cord (#0012):** Connects the cordless keyboard to the system unit, giving power to the keyboard and serially encoded data

to the system unit. When connected, it disengages the battery power, disables the infrared circuit in the keyboard, and disables the infrared receiver in the system unit. System performance with or without the cord is the same. Length: 1.8m (6 ft.) straight cord. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Cordless Keyboard Overlays (#0013):** Provided for those users who may want to customize their 4860 PCjr keyboard. This option includes five overlays in one package. An overlay fits between the keyboard keys and covers the preprinted symbols. Overlays may be customized by writing on them, by typing on them, or by having them printed commercially. The overlays are made of blank heavy stock paper and are scored so that they may be easily folded for storage and distribution.

**Connector for TV (#0020):** Allows the 4860 PCjr to use a standard home television set as an output device. This option connects to the VHF terminals of the television set and has a selection switch that allows the TV to be used in either a "computer" or "TV" mode. The Connector for TV plugs into the system unit. Supports TV sets made for operation in U.S. or Canada. Includes sealed RF modulator certified within the limits for an FCC class-B computing device for operation on TV channel 3 or 4. Weight: 12.5 oz. Prerequisites: A user-supplied television set is required. For connection to cable TV and in "TV" mode, a user-supplied 75-ohm to 300-ohm converter may be required. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Adapter Cable for IBM Color Display (#0021):** Allows for attachment of the 5153 mdl 001 Color Display. Provides one connector to match the 5153 mdl 001 Color Display cable connector, and another to match the 4860 PCjr system unit display attachment connector. Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Adapter Cable for Cassette (#0022):** Allows for attachment of a user-supplied cassette recorder/player to the cassette connector on the rear of the system unit for storage of programs and data. Maximum: One. Field Installation: Yes. Prerequisites: A user-supplied cassette recorder/player is required. Cassette recorder/player to be connected requires all of the following type connectors (or equivalent): Belden Style-51 miniature phone-plug (auxiliary); Belden Style-51 miniature phone-plug (earphone); Belden Style-56 subminiature phone-plug (remote). Customer Setup: Yes.

**Carrying Case (#0023):** The Carrying Case has been made especially for the owner who occasionally wishes to safely, securely, and conveniently move or store the PCjr. The case is black with a lightly textured surface. A 3-digit combination lock aids in protecting the system. The lock combination can easily be changed by the owner. The carrying case will fit under many airline seats. The case has the capacity for: PCjr system unit; parallel printer attachment; connector for TV; cordless keyboard; keyboard cord; transformer and power cord; up to five diskettes; up to four program cartridges. Limitations: The Carrying Case should not be used as a shipping container. It is intended only to provide hand transportation or storage of the 4860 PCjr. The original packing material should be retained for shipping the system.

**Adapter Cable for Serial Devices (#0026):** Allows connection of PCjr system unit to serial devices such as printers and modems. A male RS-232-C connector on one end of this short cable matches standard D-type 25-pin serial device cable connectors, and a connector on the other end matches the PCjr system unit serial device attachment connector. Connection is provided for the following typical RS-232-C signal pins: transmit data, receive data, request-to-send, clear-to-send, data set ready, signal ground, carrier detect, data terminal ready. The cable length is 72mm (3 in.). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

**Mouser Cartridge (#4087):** A fast-paced, arcade-type cartridge game for the PCjr system in which the player is cast in the role of a farmer whose 9-room farmhouse has been overrun by mice. The object of the game is to trap, within the allotted time, all of the mice in the rooms by building traps with movable walls. To clear all of the rooms requires skill, strategy, and dexterity. Some of the rooms are not lit, and the player must locate a flashlight that can be used to illuminate a portion of the room. On the higher levels, the mice re-

produce themselves as the player is attempting to trap them. The farmer loses by running out of time or by touching a mouse. Points are awarded for each mouse trapped. The total score depends on how fast the player traps the mice. 1- or 2-player mode --- player movement with either joy stick or keyboard --- full 16-color graphics --- three-voice music and sound effects --- pause game feature --- displays high score --- nine screens --- multiple levels of difficulty. Prerequisites: Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

**Scubaventure Cartridge (#4088):** An action-packed, arcade-type game cartridge designed to run on the PCjr system. Here, each player is in control of a 3-diver expedition team that is searching the dangerous recesses of an undersea cavern for sunken treasure. Each expedition sends one diver at a time to brave the treacherous waters to collect rare fish, to avoid poisonous fish and electric eels, and to find keys to open the treasure chests. Unlike many other arcade games, two players may play simultaneously, competing for the same rare fish and for survival. Played in 1-player mode, a ghostly white diver with a strange knack for being in the wrong place at the right time accompanies you. Points are awarded for each chest opened and for each rare fish collected. 1- or 2-player mode --- simultaneous play in two-player mode --- player movement with either joy sticks or keyboard --- pause game feature --- full 16-color graphics --- 3-voice sound. Prerequisites: Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

**Crossfire Cartridge (#4091):** An exciting, arcade-type game cartridge in which the player must defend the grid-like streets of a city from the onslaught of a swarm of insects. Fortunately, the player has a fleet of three ships containing insecticide missiles to clear the streets. A bonus ship is awarded every 5,000 points. The object is to clear the town of these enemies, but, with a limited supply of ammunition and invaders coming from all directions, this is not an easy task. Points are awarded for each invader hit and for bonus targets that occasionally appear in the streets. Player movement with either keyboard or joy stick --- pause game feature --- sound on/off feature --- game restart control --- full 3-voice sound --- current high score maintained --- three difficulty settings --- full-color graphics. Prerequisites: Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

**Mine Shaft Cartridge (#4092):** A fast-paced, action-packed game cartridge in which the player maneuvers a mining car around dangerous mine shafts looking for a fortune in diamonds. In addition to the twisty, treacherous shafts, there are a number of runaway robot

miners that seem bent on destruction of the mining car. Disabling the robots and collecting diamonds earn the player points. Clearing either all of the diamonds or all of the robots out of one mine shaft will allow the player to explore the next level. Player movement with either keyboard or joy stick --- pause game feature --- sound on/off feature --- game restart control --- full three-voice sound --- current high score maintained --- full-color graphics. Prerequisites: Minimum configuration required is 4860 mdl 004 with attachment of a supported display type.

**BASIC Interpreter Cartridge (#4101):** Provides extensions to the PCjr built-in Cassette BASIC interpreter. Extensions to the language provide a full set of instructions, commands, and functions. Most of these can be used with or without DOS present. The "IBM PCjr BASIC Reference Manual" is provided with cartridge BASIC and describes the full capabilities of cassette and cartridge BASIC. Superset of advanced BASIC on the 5150 Personal Computer and the 5160 Personal Computer XT --- improves programmer productivity by reducing the need for special machine-language subroutines --- compatible with IBM Personal Computer DOS 2.1 --- current date and time of day (DOS must be present for these functions) --- path name support for tree-structured directories (DOS must be present for these functions) --- event trapping of communications, function key, joy stick, light-pen, music, and timer activity --- stores and plays musical notes --- advanced graphics: Paint, circle, get/put display contents, store and draw line segments, line styling, tiling, viewports, windows, and palette control --- supports one parallel printer --- provides a terminal emulator for asynchronous communications --- ability to load and run a BASIC program in a second cartridge slot. Prerequisites: Minimum configuration required is 4860 mdl 004 with attachment of a supported display type. IBM Personal Computer DOS 2.1 (6024120) is required for diskette input/output operations.

**Printer Cable (#5612):** Provides for the attachment of a 5152 mdl 002 Graphic Printer or equivalent to the Parallel Printer Attachment (#0009). Maximum: One. Field Installation: Yes. Customer Setup: Yes.

## ACCESSORIES (NONE)

## SUPPLIES (NONE)

## 4865 3.5 INCH EXTERNAL DISKETTE DRIVE

### PURPOSE

The IBM PC 3.5 Inch External Diskette Drive (machine type 4865) enhances the IBM Personal Computer product line by making available an external diskette drive which uses the increased capacity of the 3.5 inch diskette media.

Attachment of the 4865 Diskette Drive not only increases the data storage capacity of the user, but adds the ability to interchange this data between IBM Personal Computers with 5.25 inch diskette drives, and IBM Personal Computers with 3.5 inch diskette drives. It also expands the I/O capabilities of some system units by increasing the maximum number of available diskette drives by one.

### MODELS

**Model 001:** Attaches to all models of the IBM PC, PC XT or the PPC.

**Model 002:** Attaches to all models of the IBM PC AT.

**Prerequisites:** The user must have Disk Operating System (DOS), Version 3.2 on 5/25 inch media for proper operation of the 3.5 inch External Diskette Drive. Also the Host unit must be equipped with the parts required to provide power to the external unit. The prerequisite parts are included with the 3.5 inch Diskette Drive.

**Customer Set-Up:** Yes. CSU allowance is one day. IBM set up is available at the applicable IBM hourly service rates and minimum charges.

### HIGHLIGHTS

- Data/Media Interchange between current IBM Personal Computer Family members and the 5140 PC Convertible.
- Program Product execution and backup.
- Expanded I/O Capability.

### DESCRIPTION

**4865 Model 001:** The 4865 Model 001 3.5 inch External Diskette Drive is designed to attach to the IBM PC, PC XT, or PPC. The 4865 has a permanently attached 36 inch signal/power cable that attaches directly to the existing 5.25 inch diskette drive adapter on the system unit.

Power from the system unit is redirected through an internal power split cable that is provided with the unit. This power split cable is customer installable and makes power externally available to the 3.5 inch External Diskette Drive.

**4865 Model 002:** The 4865 Model 002 3.5 inch External Diskette Drive is designed to attach to the IBM PC AT. It connects to an existing IBM Combination Disk/Diskette Drive adapter through a special external diskette drive adapter card. The adapter card is provided with the 4865, and must be customer installed in the system unit expansion slot 6 or 7.

A flat signal cable, included with the 4865, is used to internally connect the external diskette drive adapter card to the combination disk/diskette drive adapter. The Model 002 is connected to the external diskette drive adapter. Connection is via a combination signal/power cable. This 36 inch cable is permanently attached to the 4865.

Power for the Model 002 is obtained from the external diskette drive adapter card. A special internal power split cable, which is provided with the unit, provides power to the adapter card.

The 4865 Model 002 provides the same functions for the IBM PC AT that the Model 001 provides for the IBM PC, PC XT and PPC.

### Standard Specifications:

- Formats 3.5 inch double sided diskette with 80 tracks, 9 sectors per track
- Stores approximately 720KB of data
- Interface signals and timings correspond to the ANSI standard for a 5.25 inch diskette drive
- Data transfer rate is 250K bits per second
- Access speed is only 6ms for track to track
- Head settle time is 15ms
- Weight is 1.54 kilograms (3.4 lbs.)
- Dimensions:
  - Height - 119mm (4.69 in.)
  - Width - 55mm (2.17 in.)
  - Depth - 210mm (8.27 in.)
- Certified as FCC Class B
- Power provided by the Host System

**Diskettes:** The IBM Personal Computer 3.5 Inch External Diskette Drive utilizes a new form of media: "IBM 3.5 Inch Diskettes -- double sided 2HC Inch, high capacity (720KB) diskettes. Each diskette is housed in a rigid plastic case containing a built-in write protect switch. The diskette design includes an integrated protection mechanism (metal, spring loaded, slide cover) for the area of diskette which will be accessed by the read-write heads of the unit diskette drive.

**Prerequisite - Software:** IBM Personal Computer Disk Operating System (DOS) Version 3.2 is required to operate the IBM PC 3.5 inch External Diskette Drive. Previous DOS versions will not support the new diskette units.

Initial program loading (IPL) from the IBM Personal Computer 3.5 inch External Diskette Drive is not supported by the IBM PC, PC XT, PPC or PC AT. Consequently, users of these system units will require DOS 3.2 on the 5.25 inch diskette medium for operation of an External Diskette Drive.

**Optional Software Supported:** In an effort to provide the largest possible base of software applications for the new hardware, IBM has designed the hardware and the new version of DOS (3.2) to be as compatible as possible with the existing products.

IBM PC Program Products are planned for availability on the 3.5 inch diskette media to support the 3.5" External Diskette Drive.

IBM Corporation	DisplayWrite 3*
IBM Corporation	PDS Data Edition
IBM Corporation	PDS Plans + Edition
IBM Corporation	PDS Plans Edition
IBM Corporation	PDS Reports Edition
IBM Corporation	PDS Words Edition
IBM Corporation	PDS Graphs Edition
IBM Corporation	Basic Compiler
IBM Corporation	C Compiler
IBM Corporation	DOS 3.2/Basic
IBM Corporation	Interpreter
IBM Corporation	Macro Assembler

\* Compatible with Limitations

In addition, the following independent software publishers have informed IBM that they intend to support the programs listed below on the IBM PC Convertible and IBM 3.5 inch External Diskette Drive.

Alpha Software Corp.	Data Base Manager II -
Alpha Software Corp.	The Integrator (TM)
Ashton-Tate	Electric Desk II (TM)**
Ashton-Tate	dBase III Plus (TM)
Lifetree Software, Inc.	Framework II (TM)
Living Video Text, Inc.	Volkswriter 3 (R)
Lotus Development Corp.	ThinkTank (TM)
Lotus Development Corp.	1-2-3 (TM)
Meca	Symphony (TM)
MicroPro International	Managing Your Money (TM)
MicroPro International	Wordstar (R)
MicroPro International	Wordstar (R) 2000
MicroPro International	Wordstar (R) 2000 Plus
Microrim	Wordstar (R) Professional
Microrim	R/Base (R) 5000
Microrim	*Clout (R) with FileGateway
Microsoft	*R/Base (R) 4000 Extended Report Writer
Microsoft	Microsoft (R) Flight Simulator
Microsoft	Microsoft (R) Chart
Microsoft	Microsoft (R) Multiplan
Microsoft	Microsoft (R) Project
Microstuf	Microsoft (R) WORD
Monogram/Tronix	Crosstalk XVI (TM)
MultiMate International	*Dollars & Sense (TM)
Satellite Software Int'l	MultiMate (TM)
Scarborough Systems	WordPerfect (TM)
Computer Associates Int'l	*Master Type (TM)
Inc.	
Computer Associates Int'l	Easywriter II (TM)
Inc.	
Computer Associates Int'l	SuperCalc3 (R)
Inc.	
TCS Software	SuperProject (TM)
Timberline	TCS Client Ledger System(TM)
Timberline	Timberline (R) Architect/Engineer
Timberline	Timberline (R) Estimating 1
Timberline	Timberline (R) General Ledger
Timberline	Timberline (R) Job Cost
Timberline	Timberline (R) Starter Set

\* Compatible with limitations.

\*\* Electric Desk is a trademark licensed to Alpha Software Corporation by Electric Software, Inc.

**Customer Responsibilities:** The customer is responsible for unpacking and setting up the IBM PC 3.5 inch External Diskette Drive. Set-up instructions are provided in the IBM Personal Computer Guide To Operations Update Package, which is included with each IBM PC 3.5 inch External Diskette Drive.

## COMPATIBILITY

**Hardware:** All models of the PC, PC XT, PPC and PC AT were used as HOST in testing the External Diskette Drive. In addition, the following options were tested on one or more of the above hosts:

## SPECIFIED OPERATING ENVIRONMENT

### Hardware Requirements

Either model of the 4865 is fully functional when taken directly from the shipping carton and installed, as directed in the installation and setup instructions, to a supported host.

### Software Requirements

IBM Personal Computer Disk Operating System (DOS) Version 3.2 will be available in two separate packages:

- 6280058 - on 3.5 inch diskettes, and
- 6280057 - on 5.25 inch diskettes

The user must have Disk Operating System (DOS), Version 3.2 on the 5.25 inch media for proper operation of the IBM PC 3.5 inch External Diskette Drive. Also the Host unit must be equipped with the parts required to provide power to the external unit. The prerequisite parts are included with the 3.5 inch Diskette Drive.

### PC Expansion Units, both models

### Displays plus their adapters:

- Monochrome
- Enhanced Color
- Color Graphics

### Memory Expansion Options:

- 128KB
- 256KB
- 512KB

### Miscellaneous Adapters:

- Asynchronous Communication
- Voice Communication Option
- Serial/Parallel
- PC Network

- 3278/79 Emulation
- Fixed Disk
- Parallel Printer
- Math Co-Processor (80287)
- Math Co-Processor Option
- Diskette Drive
- Game Control

## SECURITY/INTEGRITY

The user, and/or user management, is responsible for evaluation, selection, and implementation of security features, establishment of administrative procedures, and for appropriate controls in application systems.

## PERFORMANCE CONSIDERATIONS

The IBM PC 3.5 Inch External Diskette Drive performance depends upon the number and types of devices installed on the host unit and their respective power requirements.

## PACKAGING

The IBM PC 3.5 Inch External Diskette Drive is packaged in a single carton which includes:

- Model 001
  - 3.5 Inch External Diskette Drive with permanently attached signal/power cable
  - Power Split Cable
  - Cover plate (PC)
  - Cover plate (PC XT)
  - Expansion slot cover (Portable PC)
  - Update packages for PC, PC XT, PPC Guide To Operations Manual (includes one 5.25 inch diagnostic diskette)
- Model 002
  - 3.5 inch External Diskette Drive with permanently attached signal/power cable
  - Power Split Cable
  - External Diskette Drive Adapter
  - Flat signal cable
  - Update package for PC AT Guide To Operations Manual (includes one 5.25 inch diagnostic diskette for 4865, plus one 5.25 inch special 4865 driver diskette)

## DOCUMENTATION

Each IBM PC 3.5 Inch External Diskette Drive shipment will include updates to the Guide To Operations Manual provided with the System Unit, a system diagnostic diskette and, for the 4865 Model 002, a special 4865 driver diskette.

Guide to Operations (GTO)

4865 Model 001 - 6280784  
4865 Model 002 - 6280774

The Guide To Operations manual summarizes the capabilities of the IBM Personal Computer and explains the operations of the various options. It also includes a brief description of each component and explains the Problem Determination Procedures.

The following publications will be sold separately:

## Technical Reference Manual Update Packages

Tables - 6280780  
Storage Devices - 59X9945  
Adapters - 59X9946

These Manual Update Packages consist of update pages to the Technical Reference Manual for the PC, PC XT, PPC and PC AT. The Technical Reference Manual is designed to provide hardware design and interface information. These manuals are intended for programmers, engineers involved in hardware and software design, designers, and interested persons who have a need to know how the IBM Personal Computer is designed and works.

## Hardware Maintenance and Service Manual Update Package

For IBM PC - 6280801  
For IBM PC XT - 6280819  
For IBM PPC - 6280831  
For IBM PC AT - 6280811

These packages will consist of update pages for the Hardware Maintenance and Service Manual for IBM Personal Computers plus an advanced diagnostic diskette.

This publication for service personnel details many aspects of troubleshooting the unit. It includes instructions for identifying the failure of a replaceable component in addition to a complete parts catalog.

**Warranty Period:** The IBM PC 3.5 Inch External Diskette Drive has a twelve (12) month warranty from the date of customer purchase.

**Warranty Service:** Customer Carry-in Exchange (CCE) service is provided during the warranty period for the 3.5 inch External Diskette Drive.

**Warranty Options:** IBM On-Site Exchange (IOE) and Customer On-Site Exchange (COE) will be available as Warranty Upgrade options. These service offerings are described under the terms and conditions of the Agreement for Purchase of IBM Machines (Z120-2892).

Authorized Personal Computer Dealers and Value Added Dealers are required to provide customer carry in warranty service as specified in their Dealer Agreements.

Authorized Personal Computer Dealers and Value Added Dealers will receive Warranty Reimbursement at the rates published in the Service Support Guide. Machine Type 4865 should be used when submitting reimbursement requests for this product.

**Maintenance Service:** Maintenance service is available under the IBM Maintenance Agreement. The following services, as described in the "Information Bulletin for Customers - IBM Service/Exchange Center Services and Associated On-Site Services" (G125-3488), are available:

IBM On-Site Exchange (IOE)  
Customer On-Site Exchange (COE)  
Customer Carry-In Exchange (CCE)

Volume Maintenance Service will be available for qualifying customers under the IBM Volume Maintenance Agreements (V125-3777, 3778, and 3779).

**Dealer Service Option:** A twelve (12) month Dealer Service Option is available for the IBM PC 3.5 Inch External Diskette Drive.

Hourly service may be obtained by calling the IBM Service/Exchange Communications Center's toll free number 1(800)428-2569. The center will direct the customer to carry or mail the failing unit to a Service/Exchange Center providing time and material service.

**IBM** IBM Canada Ltd.

**MACHINES**

**M 4865.4**  
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**SPECIAL FEATURES (NONE)**

**MODEL CONVERSIONS (NONE)**

**ACCESSORIES (NONE)**

**SUPPLIES (NONE)**

## 4869 PERSONAL SYSTEM/2 5.25-INCH EXTERNAL DISKETTE DRIVE

### PURPOSE

The 4869 Personal System/2 5.25-Inch External Diskette Drive enhances the Personal System/2 line by making available an external diskette drive that uses the 5.25-inch diskette media.

The 4869 allows users to transfer data files and execute programs that follow DOS and BIOS procedures from 5.25-inch media. The 4869 is a replacement for drive B and operates in the same fashion as an IBM system drive B.

### MODELS

#### Model 001

**Limitations:** The 4869 does not support 1.2Mb 5.25-inch diskette media or diskettes prepared on 1.2Mb drives even when a 360Kb format is used. The 4869 has a maximum formatted capacity of 360K bytes per diskette.

**Customer Setup (CSU):** The 4869 and the IBM Personal System/2 special features are customer setup. Setup instructions are included.

### HIGHLIGHTS

- Can be used for data storage and/or program execution.
- Same standard functions as the 3.5-inch diskette drive (format, read, and write).
- Data transfer rate is 250K bits per second.
- Access speed is 6ms; track to track.
- Head settle time is 15ms.

**Standard Features:** The 4869 has the following standard features:

- One 5.25-inch 360Kb diskette drive (half-high)
- Universal power supply (Auto-sensing for line frequency and voltage)
- One-year warranty
- Supports features internally installed as drive B for the 8530-021, 8550, 8560, and 8580 systems.

### DESCRIPTION

The 4869 enhances the IBM Personal System/2 product line by making available an external diskette drive that uses the 5.25-inch diskette media. The 4869 allows users to transfer data files and execute programs that follow DOS and BIOS procedures from 5.25-inch media. The 4869 is a replacement for drive B and operates in the same fashion as an IBM system drive B.

### Physical Specifications:

Width: 227mm (8.94 in.)  
 Depth: 408mm (16.06 in.)  
 Height: 62.5mm (2.46 in.)  
 Weight: 4.6kg (10 lbs.)

### Operating Environment:

Temperature: 15.6 to 32.2C (60 - 90F)  
 Relative Humidity: 8 to 80 percent  
 Maximum Wet Bulb: 22.8C (73F)

**Publications:** The following publications are shipped with the 4869, or accessory as appropriate, and are not available separately:

- (P/N 6280167) Diskette Drive Operating Instructions
- (P/N 6280213) Diskette Drive Adapter Installation Instructions
- (P/N 6280209) Diskette Drive Adapter/A Installation Instructions

**Separately Available Reference Materials:** The following publications are available for sale, and can be obtained by contacting an Authorized IBM Personal Computer Dealer or an IBM Sales Representative. They may also be obtained through the "Technical Directory", a copy of which is included with the initial system documentation. Please see the directory for details.

- S68X-2272 (P/N 68X2272) IBM Personal System/2 5.25-Inch External Diskette Drive Technical Reference
- S68X-2273 (P/N 68X2273) 5.25-Inch External Diskette Drive Supplements for the Hardware Maintenance Library

**National Language Support (NLS):** The publications listed will be available in the following languages: Danish; Dutch; English (UK); Finnish; French; German; Italian; Norwegian; Portuguese; Spanish, and Swedish.

- Diskette Drive Operating Instructions
- Diskette Drive Adapter Installation Instructions
- Diskette Drive Adapter/A Installation Instructions

### SPECIFY (NONE)

### MODEL CONVERSIONS (NONE)

### SPECIAL FEATURES (NONE)

### ACCESSORIES (NONE)

### SUPPLIES (NONE)

## 4950 SYSTEM UNIT

(NO LONGER AVAILABLE)

### PURPOSE

The 4950 System Unit is an entry level Series/1 product integrated with a Personal Computer XT. Within the Mdl A System Unit is a Series/1 microprocessor with 256K bytes of memory, a PC XT microprocessor functioning as an I/O controller, a PC keyboard, 10 10MB fixed disk drive, a 320KB diskette drive, and a terminal/host attachment card capable of attaching up to four IBM 3101 (Mdl 13, 23, or 881), 3161 Mdl 12, or 3163 Mdl 12 display stations via RS-422 (local) ports.

### MODELS

**MODEL A A00:** System Unit, 256KB Memory, 10MB Fixed Disk Drive, Fixed Disk Drive Adapter, 320KB Double-Sided Diskette Drive, Diskette Drive Adapter, Terminal/Host Attachment Card, and PC Keyboard.

**MODEL B B00:** System Unit, 256KB Memory, 320KB Double-Sided Diskette Drive, Diskette Drive Adapter, Terminal/Host Attachment Card, Expansion Unit Attachment Card.

**Prerequisites:** A 5151 Monochrome Display Mdl 001 (or equivalent) and the Monochrome Display and Printer Adapter (#4900).

For 4950 mdl B00: A 5161 Expansion Unit, mdl 003.

Series/1 I/O Executive (5719-EM1).

**Customer Setup (CSU):** All models and special features of the 4950 System Unit are customer setup.

For additional information on CSU, contact IBM.

### HIGHLIGHTS

- Entry priced Series/1 integrated with Personal Computer XT:
  - Series/1 microprocessor executes Series/1 programs
  - PC XT microprocessor controls I/O devices
- Included with the 4950 are:
  - Terminal/Host Attachment card (one maximum)
  - 10 megabyte fixed disk and adapter
  - 320 kilobyte diskette and adapter
  - Personal Computer Keyboard
- Terminal/Host Card supports up to four 3101 Display Stations (mdls 23, 13, or 881), 3161 or 3163 Display Station (mdl 12).
- Three feature slots available for additional functions
- Series/1 memory expandable to 512K bytes in 128K byte increments.
- Performs Series/1 floating point instructions - reduced speed.
- Up to two IBM 4971 printers may be attached.
- Asynchronous or BSC or SDLC communications options.
- IBM Expansion Unit 5161 mdl 003 provides additional DASD for the 4950 mdl A.
- Required IBM Personal Computer Monochrome Display (or equivalent) and standard keyboard: Used as a system console, or provides features of IBM 3101, 3161, and 3163 Display Station in block mode.
- Can function as a stand-alone Personal Computer XT.

- The following table shows the slot utilization and memory on the system board for the 4950:

SLOT NO.	TYPE	MODELS		DESCRIPTION
		A00	B00	
1	Full	Used	Used	Monochrome Display and Printer Adapter
2	Full	Used	Used	Terminal/Host Attachment Card
3	Full	Used	----	Fixed Disk Drive Adapter
	Full	----	Used	Attachment Adapter for 5161
4	Full	Open	Open	S/1 CPU and Memory
5	Full	Used	Used	
6	Full	Used	Used	5 1/4 in. Diskette Adapter
7	Spec	Open	Open	
8	Spec	Open	Open	

- Additional Series/1 memory increments of 128KB are available. Two additional memory increments can be installed on the S/1 CPU card.
- Additional Personal Computer memory increments of 64KB are available via the 64/256KB Memory Expansion Option (#1013). Personal Computer XT storage in the 4950 is limited to 512KB.
- Further expansion is available with a 5161 Expansion Unit. The 5161 mdl 002 is an expansion unit for the 4950 mdl A00. The 5161 mdl 003 is an expansion unit for the 4950 mdl B00. The 5161 mdl 003 contains eight option slots, two 10MB fixed disk drives and fixed disk adapter. The 5161 mdl 002 contains an additional 10MB Fixed Disk Drive and eight option slots. Upon installing the mdl 002 Expansion Unit, the Fixed Disk Drive and Fixed Disk Drive Adapter in the 4950 must be moved into the Expansion Unit for a total of 20MB (two 10MB Fixed Disk Drives) in the Expansion Unit. An additional diskette drive may then be installed in the 4950, resulting in a maximum configured system of 20MB Fixed Disk, 720KB diskette, and 512KB Series/1 user storage. When an Expansion Unit is attached to the 4950, one slot in each unit is occupied by an attachment card.
- One 10MB Fixed Disk Drive is standard in the 4950 mdl A00. The disk drive has the same physical dimensions and mounting as the 320KB diskette drive. Technical Information: 512 bytes per sector --- 17 sectors per track --- 306 tracks per surface --- 4 surfaces --- 3,600 rpm --- 90ms average access time --- 5M bit per second transfer rate.
- One Fixed Disk Drive Adapter is standard on the 4950 mdl A00. The Fixed Disk Drive Adapter can attach up to two 10MB Fixed Disk Drives. Technical Information: 32-bit error-correcting code --- microprocessor controlled --- on-board sector buffers --- internal diagnostics --- direct memory access (DMA) data transfer --- high-level command set --- automatic error detection and correction --- automatic retries on disk access. Maximum: One adapter per system.
- One 5-1/4 in. Diskette Drive Adapter provides for the attachment of up to two 5-1/4 in. diskette drives. The adapter is a standard feature on the 4950. Maximum: One adapter per system.

- One 5-1/4 in. Double-Sided Diskette Drive is standard. Allows the 4950 to read and write data on both sides of a soft-sectored 5-1/4 in. diskette. Formatted storage capacity is approximately 320KB (360KB with IBM Personal Computer DOS 2.0). The diskette drive has the following characteristics: Track density = 48 tracks per inch --- number of tracks = 40 per surface --- data surfaces = 2 per diskette --- rotational speed = 300 rpm --- access time = 6ms track-to-track --- data transfer rate = 20,480 bytes per second. The 5-1/4 in. Double-Sided Diskette Drive resides in the 4950 to provide diskette access from the front.
- Dimensions (approximate):
  - Height - 142mm (6 in.)
  - Width - 500mm (20 in.)
  - Depth - 410mm (16 in.)
  - Weight (approximate): 14.5kg (32 lbs.)
- Some of the options available for the 4950 System Unit include:
  - Asynchronous Communications Adapter
  - Binary Synchronous Communications Adapter
  - SDLC Communications Adapter
  - Attachment of up to two 4971 Printers
  - Four 3101s (mdl 23, 13, or 881), 3161 or 3163 Display Station (mdl 12.)
- For options supported in Personal Computer mode, see M5160 pages.

**Performance:** Series/1 4950 system performance depends upon the number and type of devices attached to the system, the operating characteristics selected for those devices, and the types of application programs being used. Performance testing has indicated that the Series/1 4950 system unit with from one to four terminals and limited communications, provides satisfactory throughput and response times for an entry level system. Communication lines, bi-synchronous and SDLC, operate at speeds up to 4800 bits per second. Guidance on performance in specific application environments is available from your IBM representative.

**Bibliography:** "IBM Series/1 4950 Guide to Operations", SX34-0148: This publication provides installation and reference information for the IBM Series/1 4950 System Unit and associated features and options. The information in this book is intended to guide the 4950 operator who does not have special training or experience in computers.

"IBM Series/1 4950 Maintenance Information Manual", SX34-0149: This manual contains maintenance information for the IBM Series/1 4950 System Unit. Description and procedures are providing to support the system at the field-replaceable-unit (FRU) level. The information in this manual is intended for use by IBM representatives (CSRs) and customer service personnel who are experienced in the maintenance of similar computer systems.

## SPECIFY

Industrial Automation Systems Specify: Plant Floor Systems (#9010): Collection or dissemination of data using plant floor terminals requiring human intervention, time and attendance, job reporting, etc., as well as automatically collected and disbursed data to and from programmable controllers, process controllers, etc. Also includes power management systems.

## SPECIAL FEATURES

**64KB Memory Module Kit (#1003):** Provides a 64KB increment of parity-checked random access memory which may be plugged into sockets on the 4950 CPU board or the 64/256KB Memory Expansion Option (#1013). Maximum: Up to four 64KB Memory Module Kit increments may be installed on the CPU board to provide an additional 256KB. The 64/256KB Memory Expansion Option provides 64KB of memory as standard. Up to three 64KB Memory Module Kit

increments may be customer-installed on a 64/256KB Memory Expansion Options to provide an additional 192KB of memory. Field Installation: Yes. Prerequisites: Available sockets on the 4950 CPU board or available sockets on a 64/256KB Memory Expansion Option. Must be installed in 128KB increments on 4950 CPU board. Customer Setup: Yes.

**64/256KB Memory Expansion Option (#1013):** Increments I/O controller memory by 64KB and is easily expandable to 256KB by plugging in additional increments of 64KB with 64KB Memory Module Kits (#1003). The 64/256KB Memory Expansion Option is packaged as a circuit card designed to plug into one of the 4950's full-feature system expansion slots. Technical Information: Random access memory --- starting address is set by switches --- 250ns access time --- 410ns memory cycle time --- parity checking --- sockets for expansion to 256KB. Limitations: The System Unit supports a maximum of one 64/256KB Memory Expansion Option due to physical limitations. The 64/256KB Memory Expansion Option must be installed in the 4950 System Unit and not in a 5161 Expansion Unit. Maximum: One. Field Installation: Yes. Prerequisites: An available full-feature system expansion slot is required for the 64/256KB Memory Expansion Option. Customer Setup: Yes.

**Asynchronous Communications Adapter (#2074):** Provides a channel to data processing or I/O devices outside of the immediate system. Such devices can be connected by telephone using a plug-in modem, or directly by cable when the device is nearby. Communication may be to a host computer, another Series/1, a 5150/5160, a communicating typewriter, a laboratory instrument, or other machines with an RS-232-C asynchronous interface. Program selects appropriate speed (300-9600 bps), format (5-, 6-, 7, or 8-bit characters), parity and stop bits to properly interface to the attached device. One 25-pin "D" shell, male-type connector is provided to attach peripheral devices. A current-loop interface is provided in the same connector. A jumper block is provided to select the voltage or the current-loop interface. Limitation: Cannot be installed if either a BSC or SDLC Communications Adapter is included in the system. Current-loop interface is not supported by the Series/1 I/O Executive licensed program. Maximum: Two. Cable: A user-supplied communication cable is required for connection of external modems or other devices to the Asynchronous Communications Adapter. Field Installation: Yes. Prerequisites: An available special-feature (small) or full-feature system expansion slot is required. Customer Setup: Yes.

**Binary Synchronous Communications (BSC) Adapter (#2075):** The BSC Adapter provides the ability for a 4950 attached to a host system via communications lines to participate in a network using BSC protocol. The network may be either switched or nonswitched line. Technical Information: EIA RS-232-C interface --- operates at up to 4800 bps switched or nonswitched line support --- provides modem control functions --- facilitates program controlled data transfer --- supports electrical wrap and error status reporting --- prioritized interrupt system controls. Limitations: Only one BSC Adapter or SDLC Adapter may be installed on the same system. Maximum: One. Cable: The Communications Adapter Cable (#2067) allows the user to connect the BSC Adapter card to a modem via a plug at the rear of the 4950. The cable is double-shielded and approximately 3m (10 ft) long. A wrap connector is provided to test the cable. Field Installation: Yes. Prerequisites: An available full-feature system expansion slot. An external modem must be cable-connected between the BSC Adapter and the telephone line. Customer Setup: Yes.

**SDLC Communications Adapter (#2090):** The SDLC Communications Adapter provides the ability for a 4950 attached to a host system via communications lines to participate in a network using SDLC protocol. Technical Information: EIA RS-232-C interface --- operates at up to 4800 bps with switched or nonswitched line support (including multipoint) --- provides modem control functions --- facilitates program controlled data transfer --- supports electrical wrap and error status reporting --- prioritized interrupt system controls. Limitations: Only one BSC Adapter or SDLC Communications Adapter may be installed. Maximum: One. Cable: The Communications Adapter Cable (#2067) allows the user to connect the SDLC Communications Adapter Card to a modem via a plug at the rear of the 4950. The cable is double-shielded and approximately 3m (10 ft) in length. A wrap connector is provided to test the cable. Field In-

stallation: Yes. Prerequisites: An available full-feature system expansion slot. An external modem must be cable-connected between the SDLC Communications Adapter and the telephone line. Customer Setup: Yes.

**5-1/4 Inch Double-Sided Diskette Drive (#3810):** Allows the 4950 to read and write data on both sides of a soft-sectored 5-1/4 in. diskette. Formatted storage capacity is approximately 320KB (360KB with IBM Personal Computer DOS 2.0). The diskette drive has the following characteristics: Track density = 48 tracks per inch --- number of tracks = 40 per surface --- data surfaces = 2 per diskette --- rotational speed = 300 rpm --- access time = 6ms track-to-track --- data transfer rate = 20,480 bytes per second. The 5-1/4 in. Double-Sided Diskette Drive resides inside the 4950 to provide diskette access from the front. One Double-Sided Diskette Drive is standard on the 4950. Limitations: Installation of an additional 5-1/4 in. Double-Sided Diskette Drive in the 4950 may require the removal and transfer of a previously installed 10MB Fixed Disk Drive to a 5161 mdl 002. Maximum: Up to two diskette drives may be installed in a 4950. Field Installation: Yes. Customer Setup: Yes.

**Monochrome Display and Printer Adapter (#4900):** Provides for the attachment of both the 5151 Monochrome Display and the 4971 Printer. The adapter provides cable connectors for attachment of the printer and the display at the rear of the 4950. Limitations: The primary monitor/display adapter must be installed in the 4950 System Unit and not in a 5161 Expansion Unit. Maximum: One. Cable: The Printer Cable (#5612) is available to connect the 4971 to the Monochrome Display and Printer Adapter. Field Installation: Yes. Prerequisites: An available full-feature system expansion slot. Customer Setup: Yes.

**Printer Adapter (#5200):** Provides for attachment of a second 4971 Printer or a 5152 Graphics Printer. (Note: The 5152 Graphics Printer

is not supported in Series/1 mode.) This option is used when support for more than one printer is required and the Monochrome Display and Printer Adapter is already installed. The adapter provides a connector for attachment of the printer cable to the rear of the 4950. Maximum: One. Cable: The Printer Cable (#5612) is available to connect the 5152 Graphics Printer or the 4971 to the Printer Adapter. Field Installation: Yes. Prerequisites: An available special-feature system expansion slot. Customer Setup: Yes.

#### Terminal/Host Attachment Card Cables/Cable Kit:

	Option Number	Feature
3101 Display Terminal, 3601 & 3603 Display Station, 1.8m (6 ft) Cable	6450400	#0400
3101 Display Terminal, 3601 & 3603 Display Station, 15m (50 ft) Cable	6450401	#0401

#### MODEL CONVERSIONS (NONE)

#### ACCESSORIES (NONE)

#### SUPPLIES

Contact IBM.

## MACHINES

**4952 PROCESSOR**
**PURPOSE**

Provides arithmetic, logic, and control functions for Series/1.

**MODELS**

<b>Model A</b>	A00	128KB maximum, five I/O feature locations, half-width unit. 32KB basic storage provided.
<b>Model B</b>	B00	128KB maximum, 14 I/O feature locations, full-width unit. 32KB basic storage provided.
<b>Model C</b>	C00	128KB maximum, four I/O feature locations, full-width unit. 32KB basic storage and one built-in diskette drive provided. Second diskette drive optional.
<b>Model 30D</b>	30D	128KB maximum, seven I/O feature locations, full-width unit. 32KB basic storage, with a 30MB disk, optional cache and optional 1.2MB diskette.

All models are designed for mounting on support rails in a 4997 Rack Enclosure (see M4997 pages) or in an EIA standard 19-inch enclosure. Models C and 30D can also be mounted in the Stand-Alone Enclosure (#4520).

**Limitations:** 4999 Battery Backup Unit may not be used with mdl A prior to mdl A serial number 50,000 (EC 375810). Mdl B is not supported by 4999 when primary power consumption exceeds 800VA (corrected for power factor). Contact IBM for further information. 4999 may not be used with mdl C or 30D.

**Prerequisites:** For mdl A, a space in Rack Mounting Fixture (#4540). See "Accessories" in the M4959 pages.

**HIGHLIGHTS**

The 4952 is a processor unit in the Series/1 family. It provides CPU, 32,768 bytes of main storage, enclosure, and power. It includes storage address translation function (two 64KB address spaces), clock/comparator, and communications power. Three additional storage increments of 32KB each are pluggable on the processor card. The number of feature locations is model-dependent. See "Specification Table". Standard features include rich instruction set, four interrupt levels, and power failure detect/auto-restart. There are eight general purpose registers per level and byte-addressable storage. The 4952 includes a clock/comparator with a single 32-bit register, which is incremented at one millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

Mdl C provides one or two diskette drives and four I/O feature positions. The diskettes, one standard and the second an optional feature, provide the multiple functions of diskette writing and reading including input of data and programs generated offline, output of programs and data for personal or offline storage, journaling, recording of an audit trail, checkpoints, system errors, etc. Data exchange media is compatible with other systems.

**Diskette Types:** Either the 1-sided Diskette 1 or the 2-sided Diskette 2 or Diskette 2D may be used.

**Diskette Formats:** Diskettes 1 or 2 may be initialized for 128-, 256-, or 512-byte sectors. Diskette 2D may be initialized for 256-, 512-, or 1,024-byte sectors.

**Diskette Capacity:** Capacity of diskette is dependent upon type and format. **Note:** Actual useful capacity depends on the system software used and may be less than capacities shown here.

Bytes/ Sector	Sectors/ Track *	Diskette Type	Capacity (bytes)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

\* 74 data tracks per surface; Diskettes 2 and 2D have two surfaces.

**Diskette Drive:** Access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskette rotates at 360 rpm, yielding a data rate of 62,500 bytes per second and average latency of 83.8 milliseconds.

The use of flexible diskette storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading, the read/write head is in contact with the diskette, causing wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life. See guidelines in the *IBM Diskette General Information Manual* (GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading.

Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the diskette should be replaced. Unpredictable circumstances, such as contamination or severe handling, can shorten useful life. For all the above reasons, consideration should be given to providing an adequate recovery plan.

**Disk Drive Mdl 30D:** Provides a capacity of 30 megabytes per disk drive. This mdl has an average access time of 40 milliseconds. Average rotational latency is 9.5 milliseconds. The disk rotates at 3151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundary. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

**Cache Mdl 30D:** The 64 kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. No guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from a cache function.

**Environmental Restrictions:** Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See *Customer Site Preparation Manual* (GA34-0050) for details.

**Publications:** *IBM Series/1 4952 Processor and Processor Features Description* (GA34-0084), *IBM Series/1 4952 Model C Processor and Processor Features Description* (GA34-0159), and *IBM Series/1 4952 Model 30D Processor and Processor Feature Description* (GA34-0251).

**SPECIFY**

Specify codes #2XXX, #8XXX, and #9XXX apply to plant orders only ... do not use on MES orders.

For 4952 mdl B processors with serial number greater than 15400, MES 6840342 is field installable to change any low voltage specify code to any high level specify code.

**4952 Processor (cont'd)**

- Voltage (AC, 1-phase):

50 Hz	60 Hz
100V #2804	100V #2730
110V #2805	110V #2822
200V #2806	115V #9901
220V #2813	120V #9911
230V #2821	127V #2823
235V #2814 *	200V #2732
240V #2801 *	208V #9902
	220V #2803

\* #2801 and #2814 are equivalent.

- Power Cord: 1.8 meter (6 foot) cord, no specify required.
- Power Cord Codes: #2744 for Canada, #2747 for Japan.
- Attachment of 3101:

#2787 Designates that a 3101 Display Terminal is on order for this system and that its delivery is to be synchronized with that of the system.

- Type of Distribution Channel (specify one):

#9001 Sales to Third Party Participants (TPPs): Sales to Value Added Reseller, systems integrators, programming houses, and other equipment manufacturers (OEMs) who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

#9002 End-User Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application (specify one):

**Industry Terminal Systems:**

#9010 Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting.

#9011 Banking: System with banking terminal(s) attached.

#9012 Point of Sale: System with point of sale terminal(s) attached.

#9019 Other Industry Terminal System: Hospital systems or any other industry terminal systems.

**Industrial Automation:**

#9020 Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

#9021 Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

#9022 Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

#9023 Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management (FC/PM) licensed program.

#9024 Power Management - Non-FC/PM: Power management systems which will not use the FC/PM licensed program.

#9025 Facilities Management and Security: All other facilities management and security systems except Controlled Access System (CAS).

#9029 Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numerical tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators, other industrial automation.

**Communications:**

#9030 Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

#9031 Front End Processors - Large Systems.

#9032 Front End Processors - Small and Medium-Sized Systems.

#9033 Message Switching: Message routing and dispatching in a data communications network.

#9034 Telephone Switching: Switching (PABX Control), call routing, and central offices switching.

#9035 Audio Store and Forward.

#9039 Other Communications Applications: All other communications applications.

**Scientific Computation:**

#9050 Problem Solving: Engineering/Scientific Calculations. May be timesharing.

#9051 Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

**Business Data Processing:**

#9070 Remote Job Entry: RJE or remote batch terminal.

#9071 Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote job entry/batch functions.

#9072 Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

#9073 Distributed Business Processing: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

#9074 Business System: Same as #9073 but in new accounts or in enterprises with small or medium-sized systems only.

#9075 Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

#9076 Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

#9079 Other Business Applications: All other business data processing applications.

**Other Applications:**

#9090 Applications not classified in any category above: For example, graphic arts (e.g., typesetting), design and drafting, undefined government, and any other.

**Application Unknown:**

#9095 Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors:

#92AA	Number of processors
#93BB	Sequence number

For multiple processor configurations, specify #92AA where AA is the number of processors in the configuration, and #93BB where BB is the sequence number of this processor.

**Note:** Use the multiple processor specify codes given above to define the number of processors and the sequence numbers for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl. For more than 16 processors in system, contact IBM.

**4952 Processor (cont'd)**

- Diskette IPL:
  - Mdl C:
    - #9138 1st diskette primary IPL, 2nd diskette not used
    - #9139 1st diskette alternate IPL, 2nd diskette not used
    - #9140 2nd diskette primary IPL, 1st diskette not used
    - #9141 2nd diskette alternate IPL, 1st diskette not used
    - #9142 1st diskette primary IPL, 2nd diskette alternate IPL
    - #9143 2nd diskette primary IPL, 1st diskette alternate IPL
    - #9144 No IPL
  - Mdl 30D:
    - #9148 Disk primary IPL, Optional diskette not IPL device
    - #9149 Disk alternate IPL, Optional diskette not IPL device
    - #9150 Diskette primary IPL, Disk not IPL device
    - #9151 Diskette alternate IPL, Disk not IPL device
    - #9152 Disk primary IPL, Diskette alternate
    - #9153 Diskette primary IPL, Disk alternate
    - #9144 No IPL
- Diskette Functions: When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

**SPECIAL FEATURES**

All channel features which may use a feature position in this unit are presented in the "Specification Table" below. To simplify, shorten, and improve the usability of these pages, descriptions of all those features which are available on all processors, the 4959, and the 4965 are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are model-dependent considerations are presented below.

**Channel Repower (#1565):** Provides channel reprogram for the 4959 Input/Output Expansion Unit, and 4965 Storage and I/O Expansion Unit required in the processor for a 4959 or 4965 connected to 4952 mdls A, B, C, and 30D. **Field Installation:** Yes.

**Communications Indicator Panel (#2000):** Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed to show status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of a mdl B or 30D Processor only. Does not require a feature position. **Limitations:** Cannot be installed on a mdl A or C Processor. **Field Installation:** Yes.

**Diskette Drive (#4100):** Provides for a second diskette on mdl C and a single diskette drive on the mdl 30D. Does not require a feature position. **Field Installation:** Yes.

**Stand-Alone Enclosure (#4520):** For the 4952 mdls C and 30D. Consists of a 3-sided wraparound cover with decorative, removable, front and rear covers. When connecting a mdl C or 30D to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). **Limitations:** Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See Note 1 at the end of the "Specification Table". **Field Installation:** Yes.

**Stand-Alone Enclosure Cable (#4525):** Provides a 3.1 meter (10 foot) external shielded cable between a 4965 in a Stand-Alone Enclosure (#4520) and a 4952 also in a #4520. **Field Installation:** Yes. **Prerequisites:** #1565.

**Programmer Console (#5650):** [NO LONGER AVAILABLE] Provides data entry/data display console. Includes hexadecimal key pad, display lights, and ability to stop on error or on address. In addition to basic console provided with base processor. #5650 does not require a feature position. **Field Installation:** Yes. **Specify:** Nomenclature.

English US	#0150	Italian	#0132
French	#0128	Katakana	#0126
German	#0129	Spanish	#0131

**Storage Addition Module - 32,768 Bytes (#6306):** Provides additional processor main storage in 32,768-byte increments. Mounts on processor card. **Maximum:** Three. **Field Installation:** Yes.

**Cache (#6400):** Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance

improvement (mdl 30D). The cache option does not require a feature position. **Field Installation:** No.

**Specification Table:** The table below is provided to determine if 4959s or 4965s are required to mount the desired features. Available feature positions within the processor unit are model-dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero. **Note:** Storage Addition Modules mount on processor card and do not occupy any feature positions.

Machine/ Feature Number	Feature Positions	Notes
4952 mdl A Processor	-5	
4952 mdl B Processor	-14	
4952 mdl C Processor	-4	
4952 mdl 30D Processor	-7	
#1200 Series/1 - S/370 Channel Attach	+1	(1)
#1205 4966 Diskette Magazine Unit Attach	+1	(1)
#1210 5250 Info Display System Attach	+2	(2)
#1215 4969 Magnetic Tape Subsystem Attach	+1	(1)
#1220 4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(1)
#1250 Multidrop Workstation Attach	+1	
#1300 Programmable Communications Subsystem Controller	+2	(1,2)
#1310 Multifunction Attach	+1	
#1400 Series/1 Local Comm Controller	+1	(3)
#1560 Intgrtd Digital I/O Non-Isolated	+1	(4)
#1565 Channel Repower	+1	(4,7)
#1595 Channel Socket Adapter	+1	
#1610 Async Comm Single Line Control	+1	
#2074 Binary Sync Comm Single Line Control	+1	
#2075 Binary Sync Comm Single Line Control, High-Speed	+1	
#2080 Sync Comm Single Line Control, High-Speed	+1	
#2090 Sync Data Link Control	+1	
#2091 Async Comm 8-Line Control	+1	
#2092 Async Comm 4-Line Adapter	+1	(5)
#2093 Binary Sync Comm 8-Line Control	+1	
#2094 Binary Sync Comm 4-Line Adapter	+1	(5)
#2095 Feature-Programmable 8-Line Comm Control	+1	
#2096 Feature-Programmable 4-Line Comm Adapter	+1	(5)
#3580 4962 Disk Storage Unit Attach	+1	(1)
#3581 4964 Diskette Unit Attach	+1	(1)
#3585 4979 Display Station Attach	+1	
#3590 4963 Disk Subsystem Attach	+1	(1)
#3595 4967 High Performance Disk Subsystem Attachment	+1	(1)
#5430 Customer Direct Program Control Adapter	+1	(4)
#5620 4974 Printer Attach	+1	
#5630 4973 Line Printer Attach	+1	
#5640 Printer Attachment 5200 Series	+1	
#6305 4982 Sensor I/O Unit Attach	+1	(1,4)
#7840 Timers	+1	(4)
#7850 Teletypewriter Adapter	+1	(6)
#7880 Telephone Comm Controller	+1	
#7881 Telephone Comm Adapter	+1	(5)

**4952 Processor (cont'd)**

RPQ	D02038 4978 Display Station Attach	+1
RPQ	D02118 GPIB Adapter	+1
RPQ	D02241 Series/1 Attach	+1
RPQ	D02242 Series/1 Attach	+1

**Notes:**

- (1) Not supported on the Stand-Alone Enclosure due to flat or internal cabling.
- (2) Must be contiguous I/O feature positions.
- (3) Contact IBM when considering the use of this feature.
- (4) This feature may be placed in mdl B feature position A (leftmost). Other features may not be located in this position. Does not apply to mdls A, C, and 30D.
- (5) Must be contiguous I/O feature position with its associated controller.
- (6) This feature may be placed in mdl B feature position A (leftmost) if no system + and - 12 V DC power is required.
- (7) Supported in Stand-Alone Enclosure only with Stand-Alone Enclosure Cable (#4525).

**MODEL CONVERSIONS (None)**
**ACCESSORIES**

**Customer Access Panel (#1590):** Assembly and cables to provide interface at surface of rack with quick disconnect type connection for Integrated Digital Input/Output (#1560) or Customer Direct Program Control Adapter (#5430) features (up to four in any mix), plus one Timer (#7840) with external sources and one Teletypewriter Adapter (#7850). Connecting cables from panel for Timer and Teletypewriter Adapter are included. Cables for connected Integrated Digital Input/Output and Customer Direct Program Control Adapter are obtained separately. See #1593 and #1594 below. **Field Installation:** Yes. **Restrictions:** May not be mounted behind the following units: 4952A without EC375810, any mdl 30D or any unit in a Stand-Alone Enclosure (#4520).

**Customer Access Panel - Integrated DI/DO Cable (#1593):** Internal cable which connects Integrated Digital Input/Output (#1560) with Customer Access Panel (#1590). Provides both plug and receptacle at Customer Access Panel and connectors at Integrated Digital Input/Output feature. Up to a total of six #1593s and #1594s may be accommodated in each full-width machine. (Half-width machines are limited by available feature positions.)

**Customer Access Panel - Customer DPC Adapter Cable (#1594):** Internal cable which connects Customer Direct Program Control Adapter (#5430) with Customer Access Panel (#1590). Provides both plug and receptacle at Customer Access Panel and connectors at Customer Direct Program Control Adapter. Up to a total of six #1593s and #1594s may be accommodated in each full-width machine. (Half-width machines are limited by available feature positions.) **Field Installation:** Yes.

**Frame Stand (P/N 6841365):** Provides a steel stand capable of supporting a 4952 mdl C or 30D and a 4975 Printer. The stand rests on glides, and comes in a pebble gray color only.

**Auxiliary Features/Cables/Connector Kits:** Certain devices, cables, etc., involved in system installation are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

**SUPPLIES**

**Diskettes:** The 4952 mdls C and 30D use the 1-sided Diskette 1 or the 2-sided Diskette 2 or Diskette 2D. The 4952 mdl C or 30D may be used to reformat the diskettes. Single diskettes are packaged 10 per box. Minimum order is one box.

## 4953 PROCESSOR

(The 4953 is no longer available ... certain features, RPQs, and accessories are still available.)

### PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

### MODELS

**Model A A00:** 64K maximum, 4 I/O feature or storage locations, half-width unit. 16KB basic storage provided.

**Model B B00:** 64KB maximum, 13 I/O feature or storage locations, full-width unit. 16KB basic storage provided.

**Model C C00:** 64KB maximum, 4 I/O feature or storage locations, half-width unit. 32KB basic storage provided.

**Model D D00:** 64KB maximum, 13 I/O feature or storage locations, full-width unit. 32KB basic storage provided.

All models are designed for mounting in a 4997 or an EIA standard 19-inch rack enclosure.

**Prerequisites:** For model A or C space in Rack Mounting Fixture (#4540). See "Auxiliary Features" in M4959 pages.

### HIGHLIGHTS

- Processor Unit in Series/1 family. Internal performance approximately 1.25 times that of 4952. Provides CPU, 16,384 bytes or 32,768 bytes of main storage, enclosure, and power. Includes storage address translation function (eight 64KB address spaces), and communications power. Three additional storage increments of 64KB each are pluggable on the storage card. Number of I/O feature locations is mdl-dependent. See "Specifications Table" at end of section. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart. Eight general purpose registers per level. Byte-addressable storage.

**Environmental Restriction:** Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See "Customer Site Preparation Manual" (GA34-0050) for details.

**Publications:** "IBM Series/1 4953 Processor and Processor Features Description" (GA34-0022).

### SPECIFY

- Power (AC, 1-phase): With a 1.8m (6 ft) cord.

50 HZ		60 HZ	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811	208V	#9902
200V	#2806	230V	#9904
220V	#2813		
235V	#2814		

- Type of Distribution Channel: Specify only one.

#9001 - Sales to Third Party Participants (TPPs): Sales to systems integrators, programming houses, other

equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business concerns who resell to their independent franchises or distributors.

#9002 - End-User Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: Specify only one.

### Industry Terminal Systems:

#9010 - Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

#9011 - Banking: System with banking terminal(s) attached.

#9012 - Point of Sale: System with point of sale terminal(s) attached.

#9019 - Other Industry Terminal System: Hospital systems or any other industry terminal systems.

### Industrial Automation:

#9020 - Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

#9021 - Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

#9022 - Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

#9023 - Power Management - FC/PM: Power Management Systems which will use the Facilities Control/Power Management Program Product (FC/PM).

#9024 - Power Management - Non-FC/PM: Power Management Systems which will not use the FC/PM Program Product.

#9025 - Facilities Management and Security: All other facilities management and security systems (except Controlled Access System (CAS)).

#9029 - Other Industrial Automation: Controlled Access System (CAS), production monitoring, testing, and inspection (other than electronic test), discrete piece manufacturing, numerical control tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators, other industrial automation.

### Communications:

#9030 - Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high speed lines to a remote computer.

#9031 - Front-End Processors - Large Systems: Front end processors for large systems.

#9032 - Front-End Processors - Small Systems: Front end processors for small systems.

#9033 - Message Switching: Message routing and dispatching in a data communications network.

#9034 - Telephone Switching: Switching (PABX control), call routing, and central office switching.

#9035 - Audio Store and Forward.

#9039 - Other Communications Applications: All other communications applications.

Scientific Computation:

#9050 - Problem Solving: Engineering/Scientific Calculations. May be timesharing.

#9051 - Instructional: Stand-alone or time-shared systems for computer-assisted instruction and related functions.

Business Data Processing:

#9070 - Remote Job Entry: RJE or Remote Batch Terminal.

#9071 - Distributed Host Support - Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote Job Entry/Batch functions.

#9072 - Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications, peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

#9073 - Distributed Business Processing - Stand-alone, Large Account: Stand-alone batch or interactive system for business applications in an enterprise with large systems. Offline communications to a host system is optional.

#9074 - Business System - Small account: Same as #9073 but in enterprises with small systems as the largest system or in new accounts.

#9079 - Other Business Applications: All other business data processing applications.

Other Applications:

#9090 - Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

Application Unknown:

#9095 - Applications temporarily unknown: Specify within 15 days of order entry.

Multiple Processors:

#92AA - Number of Processors

#93BB - Sequence Number

For multiple processor configurations, specify #92AA where AA is the number of processors in the configuration, and #93BB where BB is the sequence number of this processor.

**Note:** In ordering, for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the three-digit AAS mdl code. For example, in a 2-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl. For more than 16 processor systems, contact IBM.

Power Cord Codes:

(Canada only > #2744 <)  
(Japan only > #2747 <)

Attachment of 3101:

#2787 - Designates that a 3101 Display Terminal is on order for this system and that its delivery is to be synchronized with that of the system.

Machine Nomenclature:

#2950 English US	#2932 Italian
#2928 French	#2931 Spanish
#2929 German	

SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the Specification Table below. To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 Diskette Drive and I/O Expansion Unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are model-dependent considerations are presented below.

**Channel Repower #1565:** Provides channel repower for 4959 Input/Output Expansion Unit. Required for 4959 or 4965 connected to 4953. Field Installation: Yes.

**Communications Indicator Panel #2000:** Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multi-line control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of a mdl B or D Processor only. Does not require a feature position. Limitations: Cannot be installed on a mdl A or C processor. Field Installation: Yes.

**Communications Power #2010:** Provides + and - 12 volts regulated power. Required for mdl B or D containing one or more integrated communications features #1310, #1610, #2074, #2075, #2090, #2091, #2092, #2093, #2094, #2095, #2096 and #7881. Also required for Teletypewriter Adapter (#7850) configured for EIA voltage interface or for current loop where Series/1 supplies the power. Not required for a 4953 Processor mdl A or C. This feature is installed in the power supply section and does not occupy a feature position. Field Installation: Yes.

**Programmer Console #5650:** Provides data entry/data display console. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position.

Nomenclature:

#0150 English US	#0132 Italian
#0128 French	#0131 Spanish
#0129 German	

Field Installation: Yes.

**Storage Addition - 16,384 Bytes (#6315):** (NO LONGER AVAILABLE) Provides additional processor main storage in 16,384 byte increments. Requires one feature position. Maximum: Three in mdls A and B, two in mdls C and D. Field Installation: Yes.

**Storage Addition - 32,768 Bytes (#6316):** (NO LONGER AVAILABLE) (Mdls C, D) Provides additional processor main storage in 32,768 byte increments. Requires one feature position. Maximum: One. Field Installation: Yes.

**Specification Table:** The table below is provided to determine if 4965 Diskette drive and I/O Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are mdl dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable con-

## MACHINES

figuration is that the sum of the availability and requirements numbers cannot exceed zero.

Machine/ Feature No.	Feature Positions	Note
4953-A Processor	-4	
4953-B Processor	-13	
4953-C Processor	-4	
4953-D Processor	-13	
#1200 S/1 - /370		
Channel Attach Feature	+1	
#1205 4966 Disk Magazine Unit		
Attach	+1	
#1210 5250 Information Display		
Sys Attach	+2	(6)
#1215 4969 Mag Tape		
Subsys Attach	+1	
#1300 Programmable Comm		
Subsys Cntrlr	+2	(6)
#1310 Multi-function Attach	+1	(2)
#1400 S/1 Local Comm Cntrlr	+1	(8)
#1560 Integrated Digital		
I/O Non-Isolated	+1	(1)
#1565 Channel Repower	+1	(1)
#1595 Channel Socket Adapt	+1	
#1610 Async Comm Single		
Line Control	+1	(2)
#2074 Bi-Sync Comm Single		
Line Control	+1	(2)
#2075 Binary Sync Comm		
Single Line Control/HS	+1	(2)
#2080 Sync Comm Single Line		
Control/HS	+1	(2)
#2090 Sync Data Link Control	+1	
#2091 Async Comm 8-Line Cntrl	+1	
#2092 Async Comm 4-Line		
Adapter	+1	(2,7)
#2093 Bi-Sync Comm		
8-Line Control	+1	
#2094 Bi-Sync Comm		
4-Line Adapter	+1	(2,7)
#2095 Feature-Programmable		
8-Line Comm Control	+1	
#2096 Feature-Programmable		
4-Line Comm Adapter	+1	(2,7)
#3580 4962 Disk Storage		
Unit Attachment	+1	
#3581 4964 Disk Unit Attach	+1	
#3585 4979 Display Sta Attach	+1	
#3590 4963 Disk Subsys Attach	+1	
#5430 Customer Direct Program		
Control Adapter	+1	(1)
#5620 4974 Printer Attach	+1	

#5630 4973 Line Print Attach	+1	
#6305 4982 Sensor I/O Unit		
Attachment	+1	(1)
#6315 Storage Addition		
- 16,384 Bytes	+1	
#6316 Storage Addition		
- 32,768 Bytes	+1	(5)
#7840 Timers	+1	(1)
#7850 Teletype Adapter	+1	(3,4)
#7880 Telephone Comm Cntrlr	+1	
#7881 Telephone Comm Adapt	+1	(2,7)
RPQ D02038 4978 Display		
Station Attachment	+1	
RPQ D02118 GPIB Adapter	+1	
RPQ D02241 Series/1 Attach	+1	
RPQ D02242 Series/1 Attach	+1	

### Notes:

1. This feature may be placed in 4953-B or 4953-D feature position A (leftmost). Other features may not be located in this position. Does not apply to 4953-A or 4953-C.
2. Requires #2010 to provide + and - 12 volts used in mdls B or D.
3. Requires #2010 (except in mdls A and C) to provide + and - 12 volts if the system is to provide power for the current loop or if the EIA voltage level compatibility option is selected.
4. This feature may be placed in 4953-B or 4953-D feature position A (leftmost) when the feature does not require + and - 12V DC.
5. Mdls C and D only.
6. Must be contiguous I/O feature positions.
7. Must be in contiguous I/O feature position with its associated controller.
8. Branch level systems assurance is required before ordering this feature.

### MODEL CONVERSIONS (NONE)

### ACCESSORIES

**Auxiliary Features/Cables/Connector Kits:** Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

### SUPPLIES (NONE)

## 4954 PROCESSOR

### PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

### MODELS

**Model A A00:** (NO LONGER AVAILABLE) 256KB maximum, 4 I/O feature locations, half-width unit. Basic storage of 64KB provided.

**Model B B00:** (NO LONGER AVAILABLE) 256KB maximum, 13 I/O feature locations, full-width unit. Basic storage of 64KB provided.

**Model C C00:** (NO LONGER AVAILABLE) 256KB maximum, 3 I/O feature locations, full-width unit. Basic storage of 64KB and one built-in diskette drive provided. Second diskette drive optional.

**Model 30D:** (NO LONGER AVAILABLE) 256KB maximum, six I/O feature locations, full-width unit. Basic storage 64KB, with a 30MB disk, optional cache and optional 1.2MB diskette.

**Model 60D:** (NO LONGER AVAILABLE) 256KB maximum, six I/O feature locations, full-width unit, 64KB basic storage, with a 60MB disk, optional cache and optional 1.2MB diskette.

All models are designed for mounting on support rails in a 4997 Rack Enclosure (see M4997 pages) or in an EIA standard 19-inch enclosure. Models C, 30D, and 60D can also be mounted in the Stand-Alone Enclosure (#4520). Limitations: 4999 Battery Backup Unit may not be used with mdl C, 30D, and 60D. Mdl B is not supported by 4999 when primary power consumption exceeds 800 VA (corrected for power factor).

**Prerequisites:** For mdl A, a space in Rack Mounting Fixture (#4540). See "Auxiliary Features" in M4959 pages.

### HIGHLIGHTS

- Processor unit in series/1 family.
- Internal performance approximately twice that of 4952.
- Provides CPU, 65,536 bytes of main storage, enclosure and power.
- Includes storage address translation function (eight 64KB address spaces), and communications power.
- Three additional storage increments of 64KB each are pluggable on the storage card.
- Number of I/O feature locations is mdl-dependent. See "Specifications Table" at end of section.
- Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart.
- Eight general purpose registers per level.
- Byte-addressable storage.
- Includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.
- Mdl C provides one or two diskette drives and three I/O feature positions. The diskettes, one standard and the second an optional feature, provide the multiple functions of diskette media including input of data and programs generated offline, as well as output of programs and data for personal or offline storage, journaling, recording of audit trail, checkpoints, system errors, etc. Data exchange media is compatible with

other systems using the diskette types and formats shown below.

### Standard Features

**Diskette Types:** Either the 2-sided IBM Diskette 2, IBM Diskette 2D, or the 1-sided IBM Diskette 1 may be used.

**Diskette Formats:** Diskette Type 1 or 2 may be initialized for 128, 256, or 512 byte sectors. Diskette Type 2D may be initialized for 256, 512, or 1,024 byte sectors.

**Diskette Capacity:** Capacity of diskette is dependent upon type and format. Note: Actual useful capacity depends on the system software used and may be less than capacities shown here.

BYTES/ SECTOR	SECTORS/ TRACK*	DISKETTE TYPE	CAPACITY (BYTES)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

\* 74 Data tracks per surface, Diskette-2 and 2D have two surfaces.

**Diskette Drive:** Access time includes 5 milliseconds per track crossed plus 35 milliseconds for head settling. Diskette rotates at 360 rpm, yielding a data rate of 62,500 bytes per second and average latency of 83.8 milliseconds. The use of Flexible Diskette Storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading, the read/write head is in contact with the media causing diskette wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in the storage, use, and handling can also affect diskette life (see guidelines in the "IBM Diskette General Information Manual", GA21-9182). Excessive wear, handling, or contamination can cause possible failures in recording and/or reading. Ultimate wear is to some extent dependent upon total usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the media should be replaced. Unpredictable circumstances, such as contamination or severe handling, can shorten useful life. For all the above reasons, consideration should be given to providing an adequate recovery plan.

**Disk Drive MDLS 30D and 60D:** Provides a capacity of 30 megabytes and 60 megabytes respectively per disk drive. Both mdls have an average access time of 35 milliseconds. Average rotational latency is 9.5 milliseconds. The disk rotates at 3,151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundary. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

**Cache:** The 64 kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improve-

ments are application-dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50 per cent to above 200 per cent. No guarantee of result can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from a cache function.

**Operating Environment:** Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile ambient conditions. See "Customer Site Preparation Manual", GA34-0050, for details.

### Publications:

- "IBM Series/1 4954 Model A and B Processor and Processor Features Description", GA34-0099
- "IBM Series/1 4954 Model C Processor and Processor Features Description", GA34-0154
- "IBM Series/1 4954 Models 30D and 60D Processor and Processor Feature Description", GA34-0252

### SPECIFY

Specify codes #2XXX, #8XXX, and #9XXX apply to plant orders only. Do not use on MES orders.

- **Voltage Change:** For 4954 mdl B processors, MES 6840342 is field installable to change any low voltage specify code to any high-voltage specify code.
- **Power:** All options are single phase, AC with a 1.8m (6 ft) cord.

50 HZ	60 HZ
100V #2804	100V #2730
110V #2805	110V #2822
123.5V #2811	115V #9901
200V #2806	120V #9911
220V #2813	127V #2823
230V #2821	200V #2732
235V #2814	208V #9902
240V #2801	220V #2803
240V #9914	230V #9904

- **Industrial Automation Systems Specify #9010 Plant Floor System:** Collection or dissemination of data using plant floor terminals requiring human intervention. (Time and attendance, job reporting, etc.)
- **Multiple Processors:** For multiple processor configurations, specify #92AA where AA is the number of processors in the configuration, and #93BB where BB is the sequence number of this processor. Note: In WT AAS for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the three-digit WT AAS mdl code. For example, in a two-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl.

- **Diskette IPL:**

- Mdl C:

#9138 First Diskette Primary IPL, Second Diskette not used.  
#9139 First Diskette Alternate IPL, Second Diskette not used.  
#9140 Second Diskette Primary IPL, First Diskette not used.  
#9141 Second Diskette Alternate IPL, First Diskette not used.  
#9142 First Diskette Primary IPL, Second Diskette Alternate IPL.

#9143 Second Diskette Primary IPL, First Diskette Alternate IPL.  
#9144 No IPL.

- Mdls 30D and 60D:

#9148 Disk primary IPL, Optional diskette not IPL device.  
#9149 Disk alternate IPL, Optional diskette not IPL device.  
#9150 Diskette primary IPL, Disk not IPL device.  
#9151 Diskette alternate IPL, Disk not IPL device.  
#9152 Disk primary IPL, Diskette alternate.  
#9153 Diskette primary IPL, Disk alternate.  
#9144 No IPL

- When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

- **Power Cord Codes:** #2744 for Canada, #2747 for Japan.
- **Attachment of 3101:** #2787 Designates that a 3101 Display Terminal is on order for this system and that its delivery is to be synchronized with that of the system.
- **Machine Nomenclature:**

English US	#2750	Japanese	
Italian	#2932	Katakana	#2926
French	#2928	Spanish	#2931
German	#2929		

### SPECIAL FEATURES

**Feature sequence:** All channel features that may use a feature position in this unit are presented in the "Specification Table" below. To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 I/O Expansion Unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are mdl-dependent considerations are presented below.

**Channel Repower (#1565):** Provides channel repower for 4959 Input/Output Expansion Unit, and 4965 Storage I/O Expansion Unit. Required for 4959 and 4965 connected to 4954. Field Installation: Yes.

**Communications Indicator Panel (#2000):** Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Lines. Mounts under front cover of a mdl B, 30D or 60D Processor only. Does not require a feature position. Limitations: Cannot be installed on a mdl A or C Processor. Field Installation: Yes.

**Floating Point (#3925):** Provides floating point instruction set. Includes single (32 bit) and double (64 bit) precision arithmetic plus conversion between binary and floating point data. Does not require a feature position. Maximum: One. Field Installation: Yes.

**Series/1 To Personal Computer Channel Attachment Feature (#4000):** Provides a Series/1 high speed channel-to-channel gateway to an IBM Personal Computer in a network environment. The Series/1 to PC channel attachment is a microprocessor controlled Series/1 feature card and a PC channel extender card (feature #4000). Series/1 to PC channel attachment cable provides a 20 ft. interconnect cable between the Series/1 and PC/PC-XT or PC-AT (feature #4001). Byte wide data transfer occurs at the maximum PC channel rate through the feature's shared data storage area. A

communication test diskette supplements the standard Series/1 diagnostics provided with this feature.

**Service Information:** Series/1 warranty and maintenance are applicable. Service for the Series/1 feature card (#4000) and PC cable interface (#4001) is available from the IBM Customer Engineering. Field Installation: Yes. Limitations: Available only on the 4959, 4965 I/O expansion units and 4954, 4955, and 4956 processors. Prerequisites: Series/1 to PC channel attachment cable, Series/1 (4954, 4955 and 4956 processors), an IBM Personal Computer System (PC/PC-XT/PC-AT) with a keyboard and monitor, and at least one diskette drive. Specify: Series/1 IPL Options: The PC can be designated as the primary, secondary, or non-IPL device.

Function/Description	Code
Primary IPL	#9501
Secondary IPL	#9502
Non-IPL Device (Default)	#9503

**Publications:** "IBM Series/1 to Personal Computer Channel Attachment Description Manual", (GA34-0287) --- "IBM Personal Computer - Series/1 to Personal Computer Channel Attachment Guide to Operations Kit", (SX34-0170) --- "IBM Personal Computer - Series/1 to Personal Computer Channel Attachment Hardware Maintenance and Service Kit", (SX34-0171).

**Series/1 To Personal Computer Channel Attachment Cable (#4001):** Provides interconnecting cable between the Series/1 feature card and the IBM Personal Computer channel extender card. The Series/1 to PC channel attachment cable is a 20 ft interconnect cable to connect the Series/1 feature card and the PC channel extender card (the Series/1 feature card and the PC channel extender card are both provided by feature code #4000). Series/1 to PC channel attachment cable is a shielded multi-twisted-pair cable and can be ordered in a 20 ft length only (feature #4001). Field Installation: Yes. Limitations: Available only on the 4959, 4965 I/O Expansion units and 4954, 4955 and 4956 processors. Prerequisites: Series/1 to PC channel attachment feature, Series/1 (4954, 4955 and 4956 processors), an IBM Personal Computer System (PC/PC-XT/PC-AT) with a keyboard and monitor, and at least one diskette drive.

**Publications:** "IBM Series/1 to Personal Computer Channel Attachment Description Manual", (GA34-0287).

**Diskette Drive (#4100):** Provides for a second diskette drive on the mdl C and a single diskette drive on the mdl 30D and 60D. Does not require a feature position. Field Installation: Yes.

**Stand-Alone Enclosure (#4520):** For the 4954 mdls C, 30D, and 60D. Consists of a 3-sided wraparound cover with decorative, removable, front and rear covers. When connecting a mdl C, 30D or 60D to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). Limitations: Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See Note 3 at the end of the "Specification Table". Field Installation: Yes.

**Stand-Alone Enclosure Cable (#4525):** Provides a 3.1 meter (10 foot) external shielded cable between a 4965 in a Stand-Alone Enclosure (#4520) and a 4954 also in a (#4520). Field Installation: Yes. Prerequisites: #1565.

**Programmer Console (#5655):** Provides data entry/data display console. New function includes segmentation register display/store and console lock. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position. Field Installation: Yes.

### ● Nomenclature:

English US	#0150	Japanese	
French	#0128	Katakana	#0126
German	#0129	Spanish	#0131
Italian	#0132		

**Storage Addition Increment - 65,536 Bytes (#6307):** (NO LONGER AVAILABLE) Provides additional processor main storage in 65,536 byte increments. Mounts on storage card. Maximum: Three. Field Installation: Yes.

**Cache (#6400):** Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance improvement (mdls 30D and 60D only). The cache option does not require a feature position. Field Installation: No

**Specification Table:** The table below is provided to determine if 4965 I/O Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are mdl dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero. All features (#1XXX through #7XXX) may be field installed.

**Note:** Storage Addition Increments mount on storage card and do not occupy any feature positions.

Machine/ Feature Number		Feature Positions	Notes
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(3)
#1250	Multidrop Workstation Attachment	+1	
#1300	Programmable Communication Controller	+2	(1,3)
#1310	Multifunction Attachment	+1	
#1400	Series/1 Local Communication Controller	+1	(4)
#1560	Integrated Digital Input/Output Non-Isolated	+1	
#1565	Channel Repower	+1	(5)
#1595	NO LONGER AVAILABLE		
#1610	Asynchronous Comm Single Line Control	+1	
#2074	Binary Synchronous Comm Single Line Control	+1	
#2075	Binary Sync Comm Single Line Control/ HS	+1	
#2080	Sync Comm Single Line Control/HS	+1	
#2090	Sync Data Line Control	+1	

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#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Control	+1	(2)
#3580	4962 Disk Storage Unit Attachment	+1	(3)
#3581	4964 Diskette Unit Attachment	+1	(3)
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	(3)
#3595	4967 High Performance Disk Subsystem Attachment Mdl 2CA	+1	(3)
#3596	4967 High Performance Disk Subsystem Attachment Mdl 3CA	+1	(3)
#5430	NO LONGER AVAILABLE		
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#5640	Printer Attachment- 5200 Series	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(3)
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	
#7880	Telephone Communication Controller	+1	
#7881	Telephone Communication		

Adapter	+1	(2)
RPQ D02038 4978 Display Station Attachment	+1	
RPQ D02118 GPIB Adapter	+1	
RPQ D02793 Storage Upgrade MES 256KB/512KB	+1	

### Notes:

1. Must be contiguous I/O feature positions.
2. Must be in contiguous I/O feature position with its associated controller.
3. Not supported in the Standalone Enclosure due to flat or internal cabling.
4. Branch level systems assurance is required before ordering this feature.
5. Supported in Stand-Alone Enclosure only with Stand-Alone Enclosure cable (#4525).

**Auxiliary Features/Cables/Connector Kits:** Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages. WT AAS Ordering Instructions: The 4954 is a Computer System.

## MODEL CONVERSIONS

**Model Upgrade 30D to 60D:** All conversions may be field installed. Any model upgrade that involves a disk storage capacity change requires replacement of the disk storage mechanism. Adequate provision must be made for retaining the data contained on the replaced disk mechanism and elimination of user proprietary information.

The upgrade purchase price for model conversion is greater than the purchase price differentials. The customer should carefully evaluate future requirements when purchasing a system.

Replaced parts from any model conversion that includes a disk storage capacity change become the property of IBM.

**Model Downgrades:** Conversion from model 60D to 30D is not recommended.

## ACCESSORIES

**Frame Stand (P/N 6841365):** Provides an attractive, steel stand capable of supporting a 4954 mdl C, 30D or 60D (within a Stand-Alone Enclosure #4520) and a 4975 Printer. The stand rests on glides and comes in a pebble gray color only.

## SUPPLIES

**Diskettes:** The 4954 mdls C, 30D or 60D use the 2-sided Diskette 2 or Diskette 2D or the 1-sided Diskette 1. Diskette 1 is prepared in 128, 256, or 512 bytes per sector. The Diskette 2 is prepared in 128, or 256 bytes per sector and must be re-initialized for other formats. The Diskette 2D is prepared in 256, 512, or 1,024 bytes per sector. The 4954 mdl C, 30D or 60D may be used to reformat the diskette. Single diskettes are packaged ten to a box. Minimum order is one box.

## 4955 PROCESSOR

### PURPOSE

Provides arithmetic, logic, and control functions for Series/1.

### MODELS

**Model A A00:** (NO LONGER AVAILABLE) 64KB maximum, eight I/O feature locations, full width unit. 16KB basic storage provided.

**Model B B00:** (NO LONGER AVAILABLE) 128KB maximum, three I/O feature locations, full width unit.

**Model C C00:** (NO LONGER AVAILABLE) 64KB maximum, ten I/O feature locations, full width unit. 32KB basic storage provided.

**Model D D00:** (NO LONGER AVAILABLE) 128KB maximum, seven I/O feature locations full width unit. 32KB basic storage provided.

**Model E E00:** (NO LONGER AVAILABLE) 256KB maximum, seven I/O feature locations, full width unit. Includes communications power (function similar to #2010) and storage address translation function (eight 64KB address spaces).

**Model F F00:** (NO LONGER AVAILABLE) 512KB maximum, seven I/O feature locations, full width unit. Includes communications power (function similar to #2010) and storage address translation function (eight 64KB address spaces).

All models are designed for mounting on support rails in a 4997 (see M4997 pages) or in an EIA standard 19-inch enclosure.

**Limitations:** Model E and model F are not supported by the 4999 Battery Backup Unit where primary power consumption exceeds 800VA (corrected for power factor). Contact IBM for further information.

### HIGHLIGHTS

- Processor Unit in Series/1 family.
- Internal performance approximately 3.0 to 3.5 times that of 4952.
- Provides CPU, up to 524,288 bytes of main 955.2 storage, enclosure, and power.
- Number of feature locations is mdl dependent.
- See Specifications Table at end of section.
- Standard features include rich instruction set, four interrupt levels, storage protect, power failure detect/auto restart.
- Eight general purpose registers per level.
- Byte addressable storage.

**Environmental Restriction:** Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These contaminants may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See "Customer Site Preparation Manual" (GA34-0050) for details.

**Publications:** "IBM Series/1 4955 Processor and Processor Features Description" (GA34-0021)

### SPECIFY

Specify codes, #0XXX, #2XXX, 8XXX, and 9XXX, apply to plant orders only. Do not use on MES orders.

- Power: All options are 1-phase, AC with a 1.8m (6 ft) cord.

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	115V	#9901
123.5V	#2811	200V	#2732
200V	#2806	208V	#9902
220V	#2813	230V	#9904
235V	#2814		

- Machine Nomenclature:

English US	#2750	Japanese/	
French	#2928	Katakana	#2926
German	#2929	Spanish	#2931
Italian	#2932		

- Power Cord: #2744 for Canada, #2747 for Japan.
- Attachment of 3101: #2787 designates that a 3101 Display Terminal is on order for this system and that its delivery is to be synchronized with that of the system.
- Type of Distribution Channel: (Specify only one)

#9001 - Sales to Third Party Participants (TPPs): Sales to systems integrators, programming houses, other equipment manufacturers (OEMs), who, in turn, resell to end-users. Includes sales to business sales to business concerns who resell to their independent franchises or distributors.

#9002 - End-user Sales: Sales directly to the business concern which will use the system for the intended application.

- Primary Application: (Specify only one)

#### Industry Terminal Systems

#9010 - Plant Floor System: Collection or dissemination of data using plant floor terminals requiring human intervention. Time and attendance, job reporting, etc.

#9011 - Banking: System with banking terminal (s) attached.

#9012 - Point of Sale: System with point of sale terminal(s) attached.

#9019 - Other Industry Terminal System: Hospital systems or any other any industry terminal systems.

#### Industrial Automation

#9020 - Electrical Test and Inspection: Monitoring or control of equipment that measures material or products to ensure conformance with specifications.

#9021 - Process Control: Monitoring and control of production operations, primarily in the fluid and non-fluid process industries.

#9022 - Laboratory Automation Systems: Includes instrument automation, experiment monitoring, and general laboratory automation.

#9024 - Power Management-Non-FC/PM: Power Management Systems which will not; use the FC/PM licensed program.

#9025 - Facilities Management and Security: All other facilities management and security systems (except Controlled Access System (CAS)).

#9029 - Other Industrial Automation: Controlled Access System (CAS) production monitoring, testing, and inspection (other electronic test), discrete piece manufac-

turing numerical control tape control, materials handling, environmental monitoring, maritime, railroad, auto traffic control, air traffic control, simulators.

## Communications

#9030 - Concentrators/Multiplexers: Consolidation of input from terminals for transmission over high-speed lines to a remote computer.

#9031 - Front End Processors-Large systems.

#9032 - Front End Processors-Small and medium-sized systems.

#9033 - Message Switching: Message routing and dispatching in a data communications network.

#9034 - Telephone Switching: Switching (PABX Control), call routing, and central office switching.

#9035 - Audio Store and Forward.

#9039 - Other Communications Applications: All other communications applications.

## Scientific Computation

#9050 - Problem Solving: Engineering /Scientific Calculations. May be timesharing.

#9051 - Instructional: Stand-alone or timeshared systems for computer-assisted instruction and related functions.

## Business Data Processing

#9070 - Remote Job Entry: RJE or Remote Batch control.

#9071 - Distributed Host Support-Data Entry: Single or clustered workstation terminal controller with limited peripherals and batch communication to a host. Primarily for dedicated intelligent data entry, but may be combined with remote job entry /batch functions.

#9072 - Distributed Processing - Host Dependent: Combinations of terminal control, file management, communications peripheral control, data entry, and local processing with heavy dependency on a host processor for continuous operation.

#9073 - Distributed Business Processing-Stand-alone, Large Account: Stand-alone batch or interactive system for interactive business applications in an enterprise with large systems. Offline communications to a host system optional.

#9074 - Business System - Small account: Same as #9073 but in new accounts or in enterprises with small or medium-sized systems only.

#9075 - Business Problem Solving: Series/1 installed for the primary purpose of providing non-DP professional business problem solving support.

#9076 - Office Automation: Series/1 installed primarily for text processing, electronic mail, audio distribution, etc., with or without some commercial applications.

#9079 - Other Business Applications: All other business data processing applications.

## Other Applications

#9090 - Applications not classified in any category above: For example, graphic arts (typesetting, etc.), design and drafting, undefined government, and any other.

## Application Unknown

#9095 - Applications temporarily unknown: Specify within 15 days of order entry.

- Multiple Processors: For multiple processor configurations, specify #92AA where AA is the number of processors in the configuration, and #93BB where BB is the sequence number of processor.

**Note:** In WTAAS, for processors which are part of a multiprocessor system, use a suffix X as the low-order digit in the 3-digit WTAAS mdl code. For example, in a 2-processor system using mdl B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence numbers for each processor in a multiprocessor system. Processors in a multiprocessor system need not be of the same type or mdl. For complex multiple processor systems, contact IBM for more information.

## SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the Specification Table below. To simplify, shorten and improve the usability of these pages, the descriptions of all those features which are available in all processors, the 4965 Storage and I/O Expansion Unit and the 4959 I/O Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are mdl-dependent considerations are presented below.

**Channel Repower (#1565):** Provides channel repower for a 4959 I/O Expansion Unit, and 4965 Storage and I/O Expansion Unit. Required in the processor for a 4959 or 4965 connected processor for a 4959 or 4965 connected to 4955, all models. Field Installation: Yes.

**Communications Indicator Panel (#2000):** Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed to show status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data lines. Mounts under front cover of 4955. Does not require a feature position. Field Installation: Yes

**Communications Power (#2010):** (NO LONGER AVAILABLE) Not required for Models E or F. Provides +/-12 volts regulated power. Required for a processor containing one or more communications features #1310, #1610, #2074, #2075, #2090, #2091, #2092, #2093, #2094, #2095, #2096 and #7881. Also required for Teletypewriter Adapter (#7850) configured for EIA voltage interface or for current loop where Series/1 supplies the power, and for #2080 when V.35 interface is used. This feature is installed in the power supply section and does not occupy a feature position. Field Installation: Yes.

**Floating Point (#3920):** (NO LONGER AVAILABLE) Provides floating point instruction set. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary arithmetic plus conversion between binary and floating point data. Prerequisites: I/O feature position adjacent to processor cards. Maximum: One. Field Installation: Yes.

**Series/1 To Personal Computer Channel Attachment Feature (#4000):** Provides a Series/1 high speed channel-to-channel gateway to an IBM Personal Computer in a network environment. The Series/1 to PC channel attachment is a microprocessor controlled Series/1 feature card and a PC channel extender card (feature #4000). Series/1 to PC channel attachment cable provides a 20 ft interconnect cable between the Series/1 and PC/P C-XT or PC-AT (feature #4001). Byte wide data transfer occurs at the maximum PC channel rate through the feature's shared data storage area. A communication test diskette supplements the standard Series/1 diagnostics provided with this feature. Series/1 warranty and maintenance are applicable. Service for the Series/1 feature card (#4000) and PC cable interface (#4001) is available from the IBM Customer Engineering. Field Installation: Yes. Limitations: Available only on the 4959, 4965 I/O expansion units and 4954, I/O expansion units and 4954, 4955 and 4956 processors. Prerequisites: Series/1 to PC channel attachment cable, Series/1 (4954, 4955 and

4956 processors), and IBM Personal Computer System (PC/PC-XT/PC-AT) with a keyboard and monitor, and at least one diskette drive. Specify: Series/1 IPL Options: The PC can be IPL Options: The PC can be designed as the primary, secondary, or non-IPL device.

Function/Description	Code
Primary IPL	#9501
Secondary IPL	#9502
Non-IPL Device (Default)	#9503

Publications:

- "IBM Series/1 to Personal Computer Channel Attachment Description Manual" (GA34-0287)
- "IBM Personal Computer - Series/1 to Personal Computer Channel Attachment Guide to Operations Kit" (SX34-0170)
- "IBM Personal Computer - Series/1 to Personal Computer Channel Attachment Hardware Maintenance and Service Kit" (SX34-0171)

**Series/1 To Personal Computer Channel Attachment Cable (#4001):** Provides interconnecting cable between the Series/1 feature card and the IBM Personal Computer channel extender card. Personal Computer channel extender card. The Series/1 to PC channel attachment cable is a 20 ft interconnect cable to connect the Series/1 feature card and the PC channel extender card (the Series/1 feature card and the PC channel extender card are and the PC channel extender card are both provided by feature code #4000). Series/1 to PC channel attachment cable is a shielded multi-twisted-pair cable and can be ordered in a 20 ft length only (feature #4001). Field Installation: Yes. Limitations: Available only on the 4959, 4965 I/O Expansion units and 4954, Expansion units and 4954, 4955 and 4956 processors. Prerequisites: Series/1 to PC channel attachment feature, Series/1 (4954, 4955 and 4956 processors), and IBM Personal processors), an IBM Personal Computer System (PC/PC-XT/PC-AT) with a keyboard and monitor, and at least on diskette drive.

Publications: "IBM Series/1 to Personal Computer Channel Attachment Description Manual" (GA34-0287)

**Programmer Console (#5650):** (NO LONGER AVAILABLE) Provides data entry/data display console. Includes hexadecimal key pad and display lights, ability to stop on lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position. Field Installation: Yes.

SPECIFY

• Nomenclature:

English US	#0150	Japanese	
French	#0128	Katakana	#0126
German	#0129	Spanish	#0131
Italian	#0132		

**Storage Addition - 16,384 BYTES (#6325):** Provides additional processor main storage in 16,384 byte increments. Mounts in storage addition position. Maximum: Three in mdl A, seven in mdl B. May be used as last storage card in mdls C and D. Field Installation: Yes.

**Storage Addition - 32,768 BYTES (#6326):** (Mdls C, D, and E) Provides additional processor main storage in 32,768 byte increments. Mounts storage addition position. Maximum: One in mdl C, three in mdl D. May be used as last storage card in mdl E. Field Installation: Yes.

**Storage Addition - 65,536 BYTES (#6327):** (Mdl E) Provides additional processor main storage in 65,536 byte increments. Mounts in storage addition position. Maximum: Three. Field Installation: Yes.

**Storage Addition - 131,072 BYTES (#6328):** (Mdl F) Provides additional processor main storage in 131,072 byte increments. Mounts

in storage addition position. Maximum: Three. Field Installation: Yes.

**Storage Address Relocation Translator (#6335):** (Mdls B, D) Provides capability to address up to 131,072 bytes. Required for storage sizes greater than 65,536 bytes. Does not require greater than 65,536 bytes. Does not require I/O feature position. Not required in mdl E or F. Field Installation: Yes.

**Specification Table:** The table below is provided to determine if the 4965 Storage and I/O Expansion Units or the 4959 Input/Output Expansion Units are required to mount the desired features. Units are required to mount the desired features. Available feature positions within the processor unit are mdl dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirements numbers cannot exceed zero.

Machine/ Feature Number	Feature Positions	Notes
4955-A Processor	-8	
4955-B Processor	-3	
4955-C Processor	-10	
4955-D Processor	-7	
4955-E Processor	-7	
4955-F Processor	-7	
#1200 Series/1 - System 370 Channel Attachment Feature	+1	
#1205 4966 Diskette Magazine Unit Attachment	+3	
#1210 5250 Information Display System Attachment	+2	(5)
#1215 4969 Magnetic Tape Subsystem Attach- ment	+1	
#1220 4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	
#1250 Multidrop Work- station Attach Programmable Communications Subsystem Con- troller	+2	(5)
#1310 Multifunction Attachment Series/1 Local Communications Controller	+1	(2)
#1400 Integrated Digital Input/Output Non- Isolated	+1	(7)(1) (1)
#1560 Channel Repower Channel Socket Adapter	+1	(1) (1)
#1610 Asynchronous Comm Single Line Control	+1	(2)
#2074 Binary Synchronous Comm Single Line Control	+1	(2)
#2075 Binary Sync Comm Single Line Control/HS	+1	(2)
#2080 Sync Comm Single Line		

## MACHINES

#2090	Control/HS Sync Data Link Control	+1	(8)
#2091	Asynchronous Comm 8-Line Control	+1	(2)
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)(6)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)(6)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4962 Disk Storage Unit Attachment	+1	
#3581	4964 Diskette Unit Attachment	+1	
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	
#3595	4967 High Performance Disk Subsystem Floating Point	+1	(3)
#3920	Customer Direct Program Control Adapter+1 (1)	+1	
#5430	4974 Printer Attachment	+1	
#5620	4973 Line Printer Attachment	+1	
#5630	Printer Attachment -5200 Series	+1	
#5640	4982 Sensor Input/Output Unit Attachment	+1	(1)
#6305	Timers	+1	(1)
#7840	Teletypewriter Adapter	+1	(4)(1)
#7850	Telephone Communications Controller		
#7880	Telephone Communications		
#7881			

#9900	Adapter Channel Exit Cable Reservation	+1	(2)(6)
RPQ	D02038 4978 Display Station Attachment	+1	(1)
RPQ	D02118 GPIB Adapter Series/1 Attachment	+1	
RPQ	D02241 Series/1 Attachment	+1	
RPQ	D02242 Series/1 Attachment	+1	

## Notes:

1. This feature may be placed in 4955 feature position A (left-most). Other features may not be located in this position.
2. Requires feature #2010 to provide +/-12 volts when used in mdls A, B, C, or D.
3. Requires I/O feature position immediately adjacent to processor cards.
4. Requires feature #2010 (except in mdl E or F) to provide +/-12 volts if the system is to provide power for the current loop or if the EIA voltage compatibility option is selected.
5. Must be contiguous I/O feature positions.
6. Must be in contiguous I/O feature position with its associated controller.
7. Contact IBM when considering the use of this feature.
8. Requires feature #2010 if the CCITT V.35 interface is used (except in models E or F).

## MODEL CONVERSIONS (NONE)

## ACCESSORIES

**Auxiliary Features/ Cable/Connector Kits:** Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following "Specification Table" in M4959 pages.

## SUPPLIES (NONE)

## 4956 PROCESSOR

**THERE IS MORE THAN 1 TEXT VERSION FOR THIS DOCUMENT**

### PURPOSE

Provides arithmetic, logic and control functions for Series/1.

### MODELS

**Model B10 B10:** 1,024KB maximum, 13 I/O feature locations, full-width unit. 1MB basic storage provided.

**Model E10 E10:** 2,048KB maximum, 13 I/O feature locations, full-width unit. 1MB basic storage provided.

**Model 31D 31D:** 1,024KB maximum, six I/O feature locations, full-width unit. 1MB basic storage with a 30MB disk, optional cache and an optional 1.2MB diskette. (Field upgrade only - from Model 30D.)

**Model 61D 61D:** 1,024KB maximum, six I/O feature locations, full-width unit. 1MB basic storage with a 60MB disk, optional cache and an optional 1.2MB diskette.

**Model E70 E70:** 2,048KB maximum, six I/O feature locations, full-width unit. 1MB basic storage provided, 60MB integrated disk and optional cache and an optional 1.2MB diskette.

**Model B00 B00:** (NO LONGER AVAILABLE - REPLACED BY MODEL B10) 1,024KB maximum, 13 I/O feature locations, full-width unit. 256KB basic storage provided.

**Model E00 E00:** (NO LONGER AVAILABLE - REPLACED BY MODEL E10) 2,048KB maximum, 13 I/O feature locations, full-width unit. 512KB basic storage provided.

**Model 30D 30D:** (NO LONGER AVAILABLE) 1,024KB maximum, six I/O feature locations, full-width unit. 256KB basic storage with a 30MB disk, optional cache and an optional 1.2MB diskette.

**Model 60D 60D:** (NO LONGER AVAILABLE - REPLACED BY MODEL 61D) 1,024KB maximum, six I/O feature locations, full-width unit. 256KB basic storage with a 60MB disk, optional cache and an optional 1.2MB diskette.

**Model E60 E60:** (NO LONGER AVAILABLE - REPLACED BY MODEL E70) 2,048KB maximum, six I/O feature locations, full-width unit. 512KB basic storage provided, 60MB integrated disk and an optional 1.2MB diskette.

**Model G G10:** 1,024KB maximum, six I/O feature locations, full width unit, 40MB integrated disk (5-1/4 inch) with 400KB cache and a 1.2MB diskette (5-1/4 inch). 1MB basic storage provided. See M4956 Models G10 and H10 description later in document.

**Model H H10:** 2,048KB maximum, six I/O feature locations, full width unit, 1MB basic storage provided, 40MB integrated disk (5-1/4 inch), with 400KB cache and a 1.2MB diskette (5-1/4 inch). See M4956 Models G10 and H10 description later in document.

**Model J J00:** 2MB maximum, seven I/O feature locations, full width unit, 2MB basic storage provided, 40MB integrated disk (5-1/4 inch), with 400KB Cache and a 1.2MB Diskette (5-1/4 inch). See M4956 Models G10, H10 and J00 description later in document.

**Model K K00:** 14MB maximum. 14 I/O Feature locations, full width unit. 2MB basic storage and floating point provided.

All models are designed for mounting on support rails in a 4997 (see M4997 pages) or in an EIA standard 19-inch enclosure. Models 30D, 31D, 60D, 61D, E60 and E70 can also be mounted in the stand-alone enclosure (#4520).

### Notes:

- Orders entered via WTAAS will use the three-digit code B00, B0X, C00, C0X, E00, E0X, 30D, 30X, 60D, 60X, E60, E6X, B10, B1X, C10, C1X, 31D, 31X, 61D, 61X, E70, E7X, K00 and K0X.
- Channel repower (#1565) must be ordered when a 4959 I/O expansion unit or 4965 storage and I/O expansion unit is attached to a 4956 Processor (all models).

### HIGHLIGHTS

**Models B10, 31D, and 61D:** Processor unit in Series/1 family. Internal performance is approximately twice that of the 4954. Provides CPU, 1,024K bytes of error checking and correcting (ECC) corrects all single-bit errors and detects double-bit errors, thus providing improved availability compared to a processor using parity checking. Includes storage address translation function (eight 64KB address spaces) and communication power. See the table at the end of this section. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart and eight general purpose registers per level. Byte-addressable storage. Includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

**Model E10:** Processor unit in IBM Series/1 Family. Internal performance is approximately 50% greater than that of the 4956 Model B10. Basic model provides CPU, 1,024K bytes of error checking and correcting main storage, enclosure and power. Error Checking and Correction (ECC) corrects all single bit errors and detects double bit errors, thus providing improved availability compared to a processor using parity checking. Includes storage address translation function (sixteen 64KB address spaces, eight 64KB I/O address spaces) and communication power. Additional 256KB, 512KB, and 1MB storage increments are allowed to a 2MB maximum. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart. Eight general purpose registers per level. Byte addressable storage, includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

**Model E70:** 4956 Model E70 is an integrated package for the 4956 processor. This package offers a 60MB integrated disk, an optional 1.2 megabyte diskette, and an optional 64 kilobyte microprocessor controlled cache for the disk. Any attachment card or feature that can be plugged into the 4956 processor can be plugged into the new Model E70. The system contains a new processor that is 50% faster than the 4956 Model 31D and 61D. Maximum storage is 2MB (1MB directly addressable and 1MB secondary) which is twice that of the 4956 Models 31D and 61D.

**Model K00:** Processor unit in IBM Series/1 family. Internal performance is approximately 1 MIP\*. Basic model provides 2MB of error checking and correcting (ECC) storage, high speed floating point, enclosure, 14 I/O feature locations, and power supply. Maximum storage is 14MB.

\* The internal capability of the 4956 Processor models J00 and K00 to perform at 1MIP is application dependent; actual thruput of the processor may be less.

### Diskettes:

- Diskette Types: (Models 31D, 61D, E70) Either the 2-sided Diskette 2, Diskette 2D, or the 1-sided Diskette 1 may be used (8 inch diskettes).

- **Diskette Formats:** Diskette Type 1 or 2 may be initialized for 128-, 256-, or 512-byte sectors. Diskette Type 2D may be initialized for 256-, 512-, or 1,024-byte sectors.
- **Diskette Capacity:** Capacity of diskette is dependent upon type and format.

**Note:** Actual useful capacity depends on the system software used and may be less than capacities shown here.

BYTES/ SECTOR	SECTORS/ TRACK*	DISKETTE TYPE	CAPACITY (BYTES)
128	26	1	246,272
256	15	1	284,160
512	8	1	303,104
128	26	2	492,544
256	15	2	568,320
512	8	2	606,208
256	26	2D	985,088
512	15	2D	1,136,640
1,024	8	2D	1,212,416

\* 74 Data tracks per surface. Diskette 2 and 2D have two surfaces.

**Diskette Drive:** Access time includes 5 milliseconds per track crossed plus 35 milliseconds for head setting. Diskette rotates at 360 rpm, yielding a data rate of 62,500 bytes per second and average latency of 83.8 milliseconds. The use of Flexible Diskette Storage provides significant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage, etc. It should be recognized, however, that during recording and reading, the read/write head is in contact with the media causing diskette wear over time. Variations in the rate of wear will depend upon the particular operating environment and application characteristics. Care in storage, use and handling can also affect diskette life. See guidelines in "IBM Diskette General Information Manual", GA21-9182. Excessive wear, handling, or contamination can cause possible failures in recording usage of individual tracks. Care taken to distribute data, so that accessing occurs over the entire recording surface with about the same frequency, can extend the useful life of the diskette. Actual experience with individual applications and environments will allow development of guidelines as to when the media should be replaced. Unpredictable circumstances, such as contamination or severe handling, can shorten useful life. For all the above reasons, consideration should be given to providing an adequate recovery plan.

**Disk Drive Models 30D, 31D, 60D, 61D, 60E and E70:** Provide a capacity of 30 megabytes for Model 30D and 60 megabytes for Models 60D and 60E. All models have an average access time of 35 milliseconds.

Average rotational latency is 9.5 milliseconds. The disk rotates at 3,151 rpm yielding an instantaneous data rate of 1,250,000 bytes per second. A high level of data integrity is maintained by Error Checking and Correcting (ECC) which corrects any error of nine bits or less and any error of 16 bits or less within a 2-byte boundary. Also, ECC will detect up to two 2-byte errors within any 256-byte block.

**Cache Model 30D, 31D, 60D, 61D, E60 and E70:** The 64-kilobyte cache is microprocessor controlled and has the potential to significantly improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are pre-fetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application-dependent -- test cases from a variety of applications thought to be typical have shown improvements in disk throughput ranging from 50% to above 200%. No guarantee of results can be made. Applications which are truly random (test cases found none) or which are heavily write-oriented may experience little or no improvement from a cache function.

**Environmental Restriction:** Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See Customer Site Preparation Manual (GA34-0050) for details.

#### Publications:

- "4956 Models B00 and B10 Processor and Processor Features Description" (GA34-0229)
- "4956 Models C00 and C10 Processor and Processor Features Description" (GA34-0230)
- "IBM Series/1 4956 Models 30D, 31D, 60D and 61D Processor and Processor Feature Description" (GA34-0253)
- "4956 Models E00 and E10 Processor and Processor Features Description" (GA34-0289)
- "4956 Models 60E and E70 Processor and Processor Features Description" (GA34-0293)
- "4956 Model K00 Processor and Processor Features Description" (GA34-0851)
- "IBM Series/1 4956 Processor Model K00 Maintenance Information" (SY34-0551)
- "IBM Series/1 4056 Processor Model K00 Parts Catalog" (S134-0116)

#### SPECIFY

#### MES Model Upgrades

**#9510:** Basic Storage 256KB ONLY - Use this Specify Code for MES Model Upgrades when only basic 256KB storage is required and no additional storage is wanted. This applies to Model Upgrades from 4956 Model B00, B0X, 30D, 30X, 60D, 60X to 4956 Model E00, E0X, E60 or E6X.

**#9515:** Multiple 256KB Basic Storage Cards - Use this Specify Code for MES Model Upgrades when one 256KB storage card and one or more additional 256KB storage cards are required. There are no 512KB storage cards in the processor and none are required. This Specify Code applies to Model Upgrades from 4956 Model B00, B0X, 30D, 30X, 60D or 60X to 4956 Model E00, E0X, E60 or E6X.

**Note:** These Specify Codes are mandatory at order entry time if no 512KB storage cards are present or required on the upgraded models.

Unless otherwise indicated, these specify features are only available at time of manufacture. Specify codes (#2XXX, #8XXX and #9XXX) apply to plant orders only. Do not use on MES orders unless otherwise specified.

- **Power (AC, 1-phase):** With 1.6m (6 ft) cord.

50Hz	60Hz
100V #2804	100V #2730
100V #2805	100V #2822
123.5V #2811	115V #9901
200V #2806	120V #9911
220V #2813	127V #2823
230V #2821	200V #2732
235V #2814	208V #9902
240V #2801	220V #2803
	230V #9904
	240V #9914

- **Power Cord:** #2744 for Canada, #2747 for Japan.
- **Attachment of 3101 or 316X:** #2787, designates that a 3101 or 316X display terminal is on order for this system and that its delivery is to be synchronized with that of the system.
- **Machine Nomenclature:**

English US #2750	Italian #2932
German #2929	Spanish #2931
French #2928	Japanese

Katakana #2926

● Multiple Processors:

#92AA Number of Processors  
#93BB Sequence Number

For multiple processor configurations, specify #92AA where AA is the number of processors in the configuration, and #93BB where BB is the sequence number of this processor.

**Note:** In WTAAS, for processors which are part of a multi-processor system, use a suffix X as the low-order digit in the three digit WTAAS model code. For example, in a two-processor system using Model B processors, the first will be B00 and the second will be B0X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each processor in a multiprocessor system. Processors in a multiprocessor system need not be the same type or model. For complex multiple processor systems, contact the International Support Center in Boca Raton.

● Diskette IPL:

Model C and C10

- #9138: First diskette primary IPL, optional diskette not IPL device.
- #9139: First diskette alternate IPL, optional diskette not IPL device.
- #9140: Second diskette primary IPL, optional diskette not IPL device.
- #9141: Second diskette alternate IPL, optional diskette not IPL device.
- #9142: First diskette primary IPL, second diskette alternate.
- #9143: Second diskette primary IPL, first diskette alternate.
- #9144: No IPL.

Model 30D, 31D, 60D, 61D, 60E and E70:

- #9148: Disk primary IPL, optional diskette not IPL device.
- #9149: Disk alternate IPL, optional diskette not IPL device.
- #9150: Diskette primary IPL, disk not IPL device.
- #9151: Diskette alternate IPL, disk not IPL device.
- #9152: Disk primary IPL, diskette alternate.
- #9153: Diskette primary IPL, disk alternate.
- #9144: No IPL.

When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

## SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the table at the end of this section. To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 storage and I/O expansion unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are model-dependent considerations are presented below.

**Channel Repower (#1565):** Provides channel repower for 4959 Input/Output Expansion Unit, and 4965 Storage and I/O Expansion Unit. Required for 4959 or 4965 connected to 4956 Models B00, B10, C00, C10, E00, E10, 30D, 31D, 60D, 61D, E60, E70 and K00. Field Installation: Yes.

**Communication Indicator Panel (#2000):** Provides visual display of various states and conditions of a single selectable communication line as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel.

Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Line. Mounts under front cover of the processor. Does not require a feature position. Limitation: Cannot be installed on a Model C Processor.

**Floating Point (#3925):** Provides floating point instruction set for 4956 Models B00, B10, C00, C10, 30D, 31D, 60D and 61D. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary and floating point data. Does not require a feature position. Maximum: One. Field Installation: Yes.

**Floating Point (#3926):** Provides floating point instruction set for 4956 Models E00, E10, E60 and E70 only. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary and floating point data. Does not require feature position. Maximum: One. Field Installation: Yes.

**Series/1 to Personal Computer Channel Attachment Feature (#4000):** Provides a Series/1 high speed channel to channel gateway to an IBM Personal Computer in a network environment.

### Highlights:

The Series/1 to PC channel attachment is a microprocessor controlled Series/1 feature card and a PC channel extender card\* (feature #4000). Series/1 to PC channel attachment cable (Feature #4001) provides a 20' interconnect cable between the Series/1 and PC/PC XT or PC AT. Byte wide data transfer occurs at the maximum PC channel rate through the feature's shared data storage area. A communication test diskette supplements the standard Series/1 diagnostics provided with this feature.

### Service Information:

Series/1 warranty and maintenance are applicable. Service for the Series/1 feature card (#4000)\* and PC cable interface (#4001) is available from the IBM National Service Division. Note: \*A Personal Computer Channel Extender Card is included in the #4000 ship group. Terms and conditions for installation, warranty and maintenance are the same as the Personal Computer in which the PC Channel Extender Card is installed. There is no incremental Personal Computer maintenance charge for the Personal Computer Channel Extender Card when installed in an IBM Personal Computer.

### Publications:

- "IBM Series/1 to Personal Computer Channel Attachment Description Manual" (GA34-0287)
- "IBM Personal Computer - Series/1 to Personal Computer Channel Attachment Guide to Operations Kit" (SX34-0170)
- "IBM Personal Computer - Series/1 to Personal Computer Channel Attachment Hardware Maintenance and Service Kit" (SX34-0171)

Field Installation: Yes. Limitations: Available only on the 4959, 4965 I/O expansion units and 4954, 4955 and 4956 processors. Prerequisites: Series/1 to PC channel interconnect cable, Series/1 (4954, 4955 and 4956 processors), an IBM Personal Computer System (PC, PC XT, PC AT) with a keyboard and monitor, and at least one 5-1/4 inch 360KB diskette drive. Specify: Series/1 IPL Options: The PC can be designed as the primary or secondary or non-IPL device.

Function/Description	Code
Primary IPL	#9501
Secondary IPL	#9502
Non-IPL Device (Default)	#9503

### Machine Nomenclature, PC Publications:

English UK #0927	German #0929
English US #0950	Italian #0932
French #0928	Spanish #0931

**Series/1 to Personal Computer Channel Attachment Cable (#4001):** Provides interconnecting cable between the Series/1 feature card and the IBM Personal Computer channel extender card.

## MACHINES

### Highlights:

The Series/1 to PC channel attachment cable is a 20 foot interconnect cable to connect the Series/1 feature card and the PC channel extender card (the Series/1 feature card and the PC channel extender card are both provided by feature code #4000). Series/1 to PC channel attachment cable is a shielded multi-twisted pair cable and can be ordered in a 20 foot length only (feature #4001).

Publications: "IBM Series/1 to Personal Computer Channel Attachment Description Manual" (GA34-2087).

Field Installation: Yes. Limitations: Available only on the 4959, 4965 I/O Expansion units and 4954, 4955 and 4956 processors. Prerequisites: Series/1 to PC channel attachment feature, Series/1 (4954, 4955 and 4956 processors), an IBM Personal Computer System (PC, PC XT, PC AT) with a keyboard and monitor, and at least one 5-1/4 inch 360KB diskette drive.

**Diskette Drive (#4100):** Provides for a second diskette drive on the Model C and a single diskette drive on the Model 30D, 31D, 60D, 61D, E60 and E70. Does not require a feature position. Field Installation: Yes.

**Stand-Alone Enclosure (#4520):** For the 4956 Models C, C10, 30D, 31D, 60D, 61D, E60 and E70. Consists of a three-sided wraparound cover with decorative, removable front and rear covers. When connecting a Model C00, C10, 30D, 31D, 60D, 61D, E60 and E70 to a 4965 both in the Stand-Alone Enclosure, specify Stand-Alone Enclosure Cable (#4525). Limitations: Features and devices that interconnect using flat or internal cabling are not supported in the Stand-Alone Enclosure. See Note 3 at the end of the "Specification Table." Field Installation: Yes.

**Stand-Alone Enclosure Cable (#4525):** Provides a 3.1m (10 ft) external shielded cable between a 4965 in a Stand-Alone Enclosure (#4520) and a 4956 also in a (#4520). Field Installation: Yes. Prerequisites: Yes, #4520.

**Programmer Console (#5655):** Provides data entry/data display console. Added function includes display/store into I/O segmentation registers and console lock. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to Basic Console provided with base processor. Does not require a feature position. Field Installation: Yes.

### Nomenclature:

English US	#0150	Italian	#0132
German	#0129	Spanish	#0121
French	#0128	Japanese	
		Katakana	#0126

**Storage Addition Card - 256KB Bytes (#6330):** Provides additional processor main storage in 262,144 byte increments. Requires one feature position. Maximum: Three in Models B, B10, 30D, 31D, 60D and 61D; three in Models B and 60D upgraded to Models E and 60E;

and two in Model C. (See allowable storage combinations, below.) Field Installation: Yes.

**Storage Addition Card - 512KB (#6331):** Provides additional processor main storage in 524,288-byte increments. Requires one feature position. Limitations: Total processor main storage in Models B00, B10, C00, C10, 30D, 31D, 60D and 61D cannot exceed 1024KB. Model E and 60E cannot exceed 2048KB. (See allowable storage combinations, below.)

**Basic Storage Upgrade to 512KB (#6332):** (NO LONGER AVAILABLE) Provides 524,288 bytes of processor main storage instead of 262,144 bytes (Models B00, B10, C00, C10, 30D, 31D, 60D and 61D only). Does not require a feature position. Limitations: Total processor storage cannot exceed 1024KB. Field Installation: No.

**Basic Storage Upgrade to 512KB (RPQ D02793):** (NO LONGER AVAILABLE) Provides 524,288 bytes of processor main storage (Model E and 60E only). This is a field Basic Storage Upgrade of 4956 Model B to Model E or 4956 Model 30D or 60D to 60E that contains only 256KB storage cards and a 512KB storage is required. RPQ D02793 when installed must be in feature position #1.

**Note:** Total processor main storage in Models E00, E10, E60 and E70 cannot exceed 2048KB bytes. Maximum: See allowable combinations below. Field Installation: Yes.

**Storage Addition Card - 1MB (#6334):** Provides additional processor main storage in one 1,048,576-byte increment for Models E10 and E70 only. Requires one feature position. Limitations: Total processor main storage in Models E10 and E70 cannot exceed 2,048KB (two 1MB cards). Field/Factory Installation: Yes.

**Storage Addition Card - 2Mb (#6340):** Provides additional processor main storage in one 2048Kb increment for Model K00 only.

**Storage Addition Card - 4Mb (#6341):** Provides additional processor main storage in one 4096 increment for Model K00 only.

Orders for additional storage card features #6340 and #6341 must include a Specify Code to reflect the correct storage card quantity that will be installed as a result of the order. A specify code is required so that the proper set of cross-over connectors will be supplied with the order. Only one specify code is required for the installation or removal of storage card features #6340 or #6341. Orders with multiple specify codes will be rejected. Remove/Re-install RPQs are available. The correct set of storage card connectors will be sent with the RPQ instructions. It is necessary to know what ultimate configuration is required. The correct specify code will cause the correct set of connectors to be delivered. When a card is removed a specify code must also be removed and a new specify code assigned if a feature card(s) remains. Branch Administration should remove the specify code prior to adding the new specify code when storage card features are added or removed. Factory orders for processors that contain no additional storage features do not require a specify code.

Config. Number	Additional Storage	Required Specify Code	Total Additional Storage (MB)
1	None	None	0
2	6340(Qty 1)	9511	2
3	6340(Qty 2)	9512	4
4	6340(Qty 3)	9513	6
5	6340(Qty 1) 6341(Qty 1)	9512	6
6	6340(Qty 2) 6341(Qty 1)	9513	8
7	6340(Qty 1) 6341(Qty 2)	9513	10
8	6341(Qty 1)	9511	4
9	6341(Qty 2)	9512	8
10	6341(Qty 3)	9513	12

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### Allowable Storage Combinations

Model B, 30D, 60D	Pos #1	256	256	256	256	512	512	512	512
	Pos #2		256	256	256		256	256	512
	Pos #3			256	256			256	
	Pos #4				256				
Model C	Pos #1	256	256	256		512	512	512	512
	Pos #2		256	256			256	256	512
	Pos #3			256				256	
Model E00, E60	Pos #1	512 (1)	512	512	512	512	512	512	512
	Pos #2		256	256	512	512	512	512	512
	Pos #3			256		256	256	512	512
	Pos #4						256		256
Model B, 30D, 60D Upgrade to E and E60	Pos #1	256 (2)	256 (2)	256 (2)	256 (2)				
	Pos #2		256	256	256				
	Pos #3			256	256				
	Pos #4				256				
Plus all combinations listed above for Model # and E60. (See Note 1)									
Model E10, E70	Pos #1	1MB (3)	1MB	1MB	1MB	1MB	1MB	1MB	1MB
	Pos #2		1MB	512	512	512	256	256	256
	Pos #3				512	256	256	256	256
	Pos #4						256		256
Model B10, 31D, 61D	Pos #1	1MB (3)							
	Pos #2								
	Pos #3								
	Pos #4								
Model J00, K00	CPU	2MB	2MB	2MB	2MB	2MB	2MB	2MB	2MB
	Pos #1		2MB	2MB	2MB	4MB	2MB	2MB	4MB
	Pos #2			2MB	2MB		4MB	2MB	4MB
	Pos #3				2MB		4MB	4MB	4MB

#### Notes:

1. A 512KB storage card if used must be in position #1 (except when used with 1MB storage card).
2. See Specify Code #9510 or #9515 for these storage combinations.
3. A 1MB storage card if used must be in position #1.

**Cache (#8400):** Provides a means of reducing the effective access time of the disk, which can result in a substantial system level performance improvement (Model 30D, 31D, 60D, 61D, 60E and E70). The cache option does not require a feature position. Field Installation: No.

**Specification Table:** The table below is provided to determine if 4965 Storage and I/O Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are model-dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirement numbers cannot exceed zero. All features (#1XXX through #7XXX) may be field installed.

**Note:** Storage Addition Card (#6330) occupies a feature position.

#### Machine/ Feature/ Number

#### Feature Positions Notes

4956-B00, B10 Processor	-13	
4956-C00, C10 Processor	-3	
4956-E00, E10 Processor	-13	
4956-30D, 31D, 60D, 61D, E60, or E70 Processors	-6	
4956-K00 Processor	-14	
#1200 4993 Series/1 - System/370 Channel Attachment Feature	+1	(3)
#1205 4966 Diskette Magazine Unit Attachment	+1	(3)
#1210 5250 Information Display System Attachment	+2	(1)
#1215 4969 Magnetic Tape		

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	Subsystem Attachment	+1	(3)
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(3)
#1250	Multidrop Workstation Attachment	+1	
#1300	Programmable Communication Controller	+2	(1,3)
#1310	Multifunction Attachment	+1	
#1400	Series/1 Local Communication Controller	+1	
#1560	Integrated Digital Input/Output Non-Isolated	+1	
#1565	Channel Repower	+1	(4)
#1585	No Longer Available		
#1595	Channel Socket Adapter	+1	
#1610	Asynchronous Comm Single Line Control	+1	
#2074	Binary Synchronous Comm Single Line Control	+1	
#2075	Binary Synchronous Comm Single Line Ctrl-HS	+1	
#2080	Synchronous Comm Single Line Control-HS	+1	
#2090	Synchronous Data Line Control	+1	
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Adapter	+1	(2)
#3580	4962 Disk Storage Unit Attachment	+1	(3)
#3581	4964 Diskette Unit Attachment	+1	(3)
#3585	4967 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	(3)
#3595	4967 High Performance Disk Subsystem Attach Model 2CA	+1	(3)
#4000	Series/1 to Personal Computer Channel Attachment Feature	+1	
#5430	No Longer Available		
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#5640	Printer Attachment 5200 Series	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(3)
#6330	Storage Addition Card, 256KB	+1	(5)
#6331	Storage Addition Card, 512KB	+1	(5)
#6332	Basic Storage Upgrade, 512KB (Factory Only)	+0	
#6334	Storage Addition Card, 1MB	+1	(5)
#6340	Storage Addition Card, 2Mb	+1	(6)
#6341	Storage Addition Card, 4Mb	+1	(6)
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	
#7880	Telephone Communication Controller	+1	
#7881	Telephone Communication Adapter	+1	(2)
RPQ D02038	4978 Display Station Attachment	+1	
RPQ D02118	GPIB Adapter	+1	
RPQ D02793	Storage Upgrade MES 256KB/512KB (Field Only)	+1	(5)

Notes:

1. Must be contiguous I/O feature positions.
2. Must be contiguous I/O feature position with its associated controllers.

3. Not supported in the Stand-Alone Enclosure due to flat or internal cabling.
4. Supported in Stand-Alone Enclosure only with Stand-Alone Enclosure Cable (#4525).
5. Not available for Model K00.

## MACHINES

**Auxiliary Features/Cables/Connector Kits:** Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following Specification Table in M4959 pages.

### MODEL CONVERSIONS

**Model Upgrade 30MB Disk to 60MB Disk:** All conversions may be field installed.

Any model upgrade that involves a disk storage capacity change requires replacement of the disk storage mechanism. Adequate provision must be made retaining the data contained on the replaced mechanism and elimination of user proprietary information.

The upgrade purchase prices for model conversions is greater than the purchase price differentials. The customer should carefully evaluate his future requirements when purchasing a system.

Replaced parts from any model conversion that includes a disk storage capacity change become the property of IBM.

**Model Downgrades:** (i.e. Model 60D to a Model 30D) are not recommended.

**Model Upgrades:** Model conversions are allowed for certain models of the 4956 processors. Consists of either replacing the 1MB backboard with a 2MB backboard, and/or replacing the existing processor card with a new performance processor card, and/or replacing basic storage with a 1MB storage card.

#### Possible IBM Series/1 4956 Model Upgrades:

FROM / TO	PRO- CESSOR	BACK BOARD	1MB	60MB DISK
4956-B00	E00	X	X	
	E10	X	X	
	B10		X	
4956-C00	C10		X	
4956-30D	60D			X
	E60	X	X	X
	E70	X	X	X
	31D		X	

4956-60D	E60	X	X	
	E70	X	X	X
	61D			X
4956-E00	E10			X
4956-E60	E70			X
4956-B00	K00	X	X	
4956-B10	K00	X	X	
4956-E00	K00	X	X	
4956-E10	K00	X	X	

**Note:** All models have multiple processor "X" designations. Example - B00/B0X, E60/E6X, etc.

Field installable: Customer price quotations and customer order acknowledgement letters for purchase model upgrades must state: "Installation of this model upgrade involves the removal of parts which become the property of IBM and must be returned to IBM." Model downgrades (i.e. Model E to Model B or Model 60E to Model 60D) are not recommended for field installation.

On any model upgrade that involves disk storage, adequate provision must be made to retain the data on the disk mechanism.

### ACCESSORIES

**Frame Stand (P/N 6841365):** Provides an attractive, steel stand capable of supporting a 4956 Model C00, C10, 30D, 31D, 60D, 61D, E60 and E70. Enclosure (#4520) and a 4975 Printer. The stand rests on slides and comes in a pebble grey color only.

### SUPPLIES

**Diskette:** The 4956 Model C00, C10, 30D, 31D, 60D, 61D, E60 and E70 uses the two-sided Diskette 2, Diskette 2D, or the one-sided Diskette 1. Diskette 1 is prepared in 128, 256, or 512 bytes per sector and must be re-initialized for other formats. Diskette 2 and 2D are prepared in 256, 512, or 1,024 bytes per sector. The 4956 Model C00, C10, 30D, 31D, 60D, 61D, E60 and E70 may be used to reformat the diskette. Single diskettes are packaged ten to a box. Minimum order is one box.

## 4956 PROCESSOR MDLS G10, H10, J00

## PURPOSE

Provides arithmetic logic and control functions for Series/1.

## MODELS

**Model G G10:** 1,024KB maximum, six I/O feature locations, full width unit, and a 40MB integrated disk (5-1/4 inch) with 400KB cache, 1.2MB diskette (5-1/4 inch). 1MB basic storage provided.

**Model H H10:** 2,048KB maximum, six I/O feature locations, full width unit, 1MB basic storage provided, 40MB integrated disk (5-1/4 inch), with 400KB cache and a 1.2MB diskette (5-1/4 inch).

**Model J J00:** 14MB maximum, seven I/O feature locations, full width unit, 2MB basic storage provided, 40MB Integrated Disk (5-1/4 inch), with 400KB Cache and a 1.2MB Diskette (5-1/4 inch).

All models are designed for mounting on support rails in a 4997 (see M4997 pages), an EIA standard 19-inch enclosure or in a stand-alone enclosure (#4521).

## Notes:

1. Orders entered via WT AAS will use the three-digit code G10, H10 or J00
2. Channel repower (#1565) must be ordered when a 4959 I/O expansion unit or 4965 storage and I/O expansion unit is attached to a 4956 Processor (all models).

**Limitations:** All models support four integrated DASD devices only. As an example, one 5-1/4 inch diskette and three 5-1/4 inch disks maximum, or two 5-1/4 inch diskettes and two 5-1/4 inch disks.

## HIGHLIGHTS

**Model G10:** Is a integrated package for the 4956 Series/1 processors. This package offers the same advantages as the 4956 Model B10 with 1,024KB of storage, plus a 40MB disk with a 400-kilobyte microprocessor controlled cache, 1.2-megabyte diskette and a universal power supply. Also, additional space is provided for a second 1.2-megabyte optional diskette and two additional optional 40-megabyte disks.

The internal performance of the processor is approximately twice that of the 4954. Basic model provides CPU, 1,024K bytes of error checking and correcting main storage, enclosure and power. Error checking and correcting (ECC) corrects all single-bit errors and detects double-bit errors, thus providing improved availability compared to a processor using parity checking. Includes storage address translation function (eight 64KB address spaces, eight 64KB I/O address spaces) and communication power. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart and eight general purpose registers per level. Byte-addressable storage includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

**Model H10:** Is a integrated package for the 4956 Series/1 processors. This package offers the same advantages as the 4956 Model E10 with 1,024KB of basic storage (2,048KB maximum), plus a 40MB disk with a 400-kilobyte microprocessor controlled cache, 1.2-megabyte diskette and a universal power supply. Also, additional space is provided for a second 1.2-megabyte optional diskette and two additional optional 40-megabyte disks.

The internal performance of the processor is approximately 50% greater than that of the 4956 Model B10 (or 4956 Model G10). Basic

model provides CPU, 1,024K bytes of error checking and correcting main storage, enclosure and power. Error Checking and Correction (ECC) corrects all single-bit errors and detects double-bit errors, thus providing improved availability compared to a processor using parity checking. Includes storage address translation function (16 64K address spaces, 8 64KB I/O address spaces) and communication power. Additional 256KB, 512KB and 1MB storage increments are allowed to a 2MB maximum. Standard features include rich instruction set, four interrupt levels, power failure detect/auto restart, and eight general purpose registers per level. Byte addressable storage, includes clock/comparator which has a single 32-bit register which is incremented on 1 millisecond intervals and runs continuously when power is on. A 32-bit comparator generates a class interrupt if the clock is greater than or equal to the comparator. One clock/comparator is provided on the processor card. Timers (#7840) are also available.

**Model J00:** Is an integrated package for the 4956 Series/1 processor family. This new package offers the same advantages as the models G10 and H10 with a 1 MIP\* internal performance. Provided with the standard package are 2048KB of basic storage, high speed floating point, 40MB disk, 1.2MB diskette, enclosure, 40MB microprocessor controlled cache, and universal power supply. Additional space is provided for a second 1.2MB diskette and two 40MB disks. Main storage is error checking and correction (ECC) that corrects all single bit errors and detects double bit errors, thus providing improved availability compared to a processor using parity checking. Includes storage address translation function (sixteen 64KB address spaces, 8 I/O address spaces), floating point and communication power. Maximum storage is 14Mb (2Mb directly addressable, 12Mb unmapped). The 4956 model J00 employs a seven word pre-fetch architecture. Models G10 and H10 employ a three word pre-fetch.

\* The internal capability of the 4956 Processor Models J00 and K00 to perform at 1MIP does not represent thruput; actual performance is application dependent.

**Storage:** (Models G10 and H10) A 1,024KB storage card incorporating a new technology is now offered that will replace all current basic storage cards. Each storage card has ECC (Error Checking and Correction), which is capable of single-bit error correction and double-bit error detection, which offers an increase in ECC reliability.

The 4956 Model G10 has a basic and maximum storage of 1,024KB. The 4956 Model H10 offers a basic storage of 1,024KB with a maximum of 2,048KB by adding a second storage card (#6334).

**Cache:** (Models G10, H10 and J00) The 400-kilobyte disk cache is microprocessor controlled and has the potential to improve system performance. Selected data sectors, determined by the cache control algorithm to be probable candidates for system read request, are prefetched and stored in cache. The microprocessor monitors its own "hit-ratio" and adjusts to optimize performance. Least-recently-used algorithm eliminates inactive data from cache, as space for new data is required. This allows the disk to dynamically adapt to changes in the jobstream. Performance improvements are application-dependent.

**5-1/4 Inch Diskette Drive:** (Models G10, H10 and J00) The diskette drive used within the Models G10 and H10 is a 1.2-megabyte 5-1/4 inch half-high diskette drive. The drive fits a standard half-high 5-1/4 inch form factor and provides interchange capability with current 96 track-per-inch diskettes formatted with 80 tracks for both reading and writing double-sided media. 48 TPI diskettes can be read, although interchangeability between the 96 TPI and 48 TPI drives is limited to writing diskettes in a 48 TPI drive and then reading those diskettes in a 96 TPI drive (i.e., the 96 TPI drive does not support writing 48 TPI diskettes to be read by 48 TPI drives).

Access time includes 3 milliseconds per track crossed plus 15 milliseconds for head settling. Diskette rotates at 360 RPM, yielding a data rate of 62,500 bytes per second and average latency of 83 milliseconds. The use of Flexible Diskette Storage provides signif-

icant advantages such as low cost, compact size, multiple system functions, ease of media handling and storage.

**5-1/4 Inch Disk Drive:** (Models G10, H10 and J00) The disk drives used within the Models G10 and H10 are 40-megabyte (formatted) random direct access storage devices (DASD) that uses four fixed 5-1/4 inch disk platters as storage media. The drives contain read/write and control/servo electronics, a DC spindle motor, a track positioning actuator, an air filtration system, a sealed disk enclosure, and seven read/write heads. The disk drive features an industry standard ST506/ST412 interface, buffered seek, micro-processor control, closed loop actuator servo, rotary voice coil motor drive actuator, automatic actuator lock, dedicated head landing zone and a dynamic spindle brake.

The major specifications for the disk drive are:

- Data Transfer Rate - 0.625 megabytes per second
- Rotational Speed - 3600 RPM
- Average Latency - 8.33 milliseconds
- Single Cylinder Seek Time - 8 milliseconds (average)
- Average Seek (Weighted) - 40 milliseconds (maximum)

A high level of data integrity is maintained by Error Checking and Correcting (ECC) which contains sufficient information to calculate the location and magnitude of any burst error whose length is less than or equal to two bytes if only one burst occurs per sector. Burst length is defined as the distance between the first and last bit in error. In addition, the code will also detect any single-burst error of 17 bits and most burst errors greater than 17 bits. The track format of the disk, as implemented, allows for Error Correction Code (ECC) on the data fields and Cyclic Redundancy Check (CRC) on the ID fields.

**Power Supply:** (Models G10, H10 and J00) The power supply for the Models G10 and H10 is a new universal high frequency switching supply that is capable of handling input voltages from 100 to 240 VAC.

**Environmental Restriction:** Certain atmospheric contaminants can destroy miniaturized electronic circuitry. These may be found in certain industrial and general urban environments. This machine and its features should be protected from hostile, ambient conditions. See "IBM Series/1 Customer Site Preparation", (GA34-0050), for details.

#### Publications:

- "IBM Series/1 4956 Processor Models G10 and H10 Description" GA34-0305
- "IBM Series/1 4956 Processor Models G10 and H10 Maintenance Information" SY34-0357
- "IBM Series/1 Processor 4956 Models G10 and H10 Parts Catalog" S134-0112
- "IBM Series/1 4956 Processor Model J00 Description" GA34-0850
- "IBM Series/1 4956 Processor Model J00 Maintenance Information" SY34-0550
- "IBM Series/1 4956 Processor Model J00 Parts Catalog" S134-0115

#### SPECIFY

Unless otherwise indicated, these specify features are only available at time of manufacture. Specify codes (#2XXX, #8XXX and #9XXX) apply to plant orders only - do not use on MES orders.

Models G10, H10 and J00 use a single switching power supply that has a two position switch on the rear, 115 for low range 90 to 137 VAC and high range 230 for 180 to 259 VAC. The only requirement to change voltages is the correct switch position (115 for low range and 230 for the high range) and the proper line cord to match the wall receptacle. Models G10 and H10 may be incorporated with peripheral devices already installed or mounted in a 4997 Rack Enclosure with other machine types, therefore the voltage must be specified in order to be consistent.

- Power (AC, 1-phase): With 1.8m (6 ft) cord.

4956 Processor

50 Hz		60 Hz	
100V	#2804	100V	#2730
110V	#2805	110V	#2822
123.5V	#2811	115V	#9901
200V	#2806	120V	#9911
220V	#2813	127V	#2823
230V	#2821	200V	#2732
235V	#2814	208V	#9902
240V	#2801	220V	#2803
		230V	#9904
		240V	#9914

- Power Cord #2744 for Canada, #2747 for Japan
- Machine Nomenclature:

English US	#2750	Italian	#2932
French	#2928	Japanese	
German	#2929	Katakana	#2926
		Spanish	#2931

#### Industrial Automation Systems Specify

**#9010 Plant Floor Systems:** Collection or dissemination of data using plant floor terminals requiring human intervention, time and attendance, job reprint, etc., as well as automatically collected and disbursed data to and from programmable controllers, process controllers, etc. Also, includes power management systems.

#### Multiple Processors

- #92AA Number of Processors
- #93BB Sequence Number

For multiple processor configurations, specify #92AA where AA is the number of processors in the configuration, and #93BB where BB is the sequence number of this processor.

**Note:** In WTAAS, for processors which are part of a multiprocessor systems, use a suffix X as the low-order digit in the three digit WTAAS model code. For example, in a two-processor system using Model B processors, the first will be B10 and the second will be B1X. Use the multiple processor specify codes given above to define the number of processors and the sequence number for each processor in a multiprocessor system. Processors in a multiprocessor system need not be the same type or model. For complex multiple processor systems, contact the International Support Center in Boca Raton.

#### IPL Device

- #9148 Disk Primary IPL, Diskette Not IPL Device
- #9149 Disk Alternate IPL, Diskette Not IPL Device
- #9150 Diskette Primary IPL, Disk Not IPL Device
- #9151 Diskette Alternate IPL, Disk Not IPL Device
- #9152 Disk Primary IPL, Diskette Alternate
- #9153 Diskette Primary IPL, Disk Alternate
- #9144 No IPL

When diskette function is included in a Series/1 configuration, IPL from such a device is required for loading diagnostics.

#### SPECIAL FEATURES

All channel features which may use a feature position in this unit are presented in the "Specification Table." To simplify, shorten and improve the usability of these pages, the description of all those features which are available in all processors, the 4965 Storage and I/O Expansion Unit and the 4959 Input/Output Expansion Unit are presented in the M4959 pages. Storage addition and features unique to this unit or for which there are model-dependent considerations are presented below.

**Channel Repower (#1565):** Provides channel repower for 4959 Input/Output Expansion Unit and 4965 Storage and I/O Expansion

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Unit. Required for 4959 and 4965 connected to 4956 Models G10, H10 and J00. Field Installation: Yes.

**Communications Indicator Panel (#2000):** Provides visual display of various states and conditions of a single selectable communication line, as well as providing a means of manually controlling certain modem functions. The panel attaches to any single or multiline control by a connector on the feature. Line selection and information to be displayed is selected by eight switches on the panel. Eight lights are used for the display. Coded information is displayed showing status information and modem control line settings such as Data Set Ready, Clear-to-Send, Transmit and Receive Data Line. Mounts under front cover of the processor. Does not require a feature position.

**Floating Point (#3925):** Provides floating point instruction set for the Model G10. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary and floating point data. Does not require a feature position. Maximum: One. Field Installation: Yes.

**Floating Point (#3926):** Provides floating point instruction set for the Model H10. Includes single (32-bit) and double (64-bit) precision arithmetic plus conversion between binary and floating point data. Does not require a feature position. Maximum: One. Field Installation: Yes.

**Second Diskette Drive (#4110):** Provides for a second 5-1/4 inch diskette drive on the Models G10, H10 and J00. Does not require a feature position. Field Installation: Yes.

**Second Disk Drive (#4115):** Provides for a second 40MB disk drive within either a Model G10, H10 and J00. Does not require a feature position. Field Installation: Yes.

**Third Disk Drive (#4116):** Provides for a third 40MB disk drive within either a Model G10, H10 or a Model J00. The cables and connectors are different between the second and third disk drive. Does not require a feature position. Field Installation: Yes.

**Stand-Alone Enclosure (#4521):** For the 4956 Models G10, H10 and J00. Consists of a three-sided wraparound cover with decorative, removable front and rear covers. Field Installation: Yes.

**Programmer Console (#5655):** Provides data entry/data display console. Added function includes display/store into I/O segmentation registers and console lock. Includes hexadecimal key pad and display lights, ability to stop on error or on address. In addition to basic console provided with base processor. Does not require a feature position. Field Installation: Yes.

Nomenclature:

English US	#0150	Italian	#0132
French	#0128	Japanese	
German	#0129	Katakana	#0126
		Spanish	#0131

**Storage Addition Card - 1MB (#6334):** Provides additional processor main storage in one 1,048,576-byte increment for Model H10 only. Requires one feature position. Limitations: Total processor main storage in Model H10 cannot exceed 2,048KB (two 1MB cards). Field/Factory Installation: Yes.

**Storage Addition Card - 2Mb (#6340):** Provides additional processor main storage in one 2048Kb increment for Model K00 only.

**Storage Addition Card - 4Mb (#6341):** Provides additional processor main storage in one 4096 increment for Model K00 only.

Orders for additional storage card features #6340 and #6341 must include a Specify Code to reflect the correct storage card quantity that will be installed as a result of the order. A specify code is required so that the proper set of cross-over connectors will be supplied with the order. Only one specify code is required for the installation or removal of storage card features #6340 or #6341. Orders with multiple specify codes will be rejected. Remove/Re-install RPQs are available. The correct set of storage card connectors will be sent with the RPQ instructions. It is necessary to know what ultimate configuration is required. The correct specify code will cause the correct set of connectors to be delivered. When a card is removed a specify code must also be removed and a new specify code assigned if a feature card(s) remains. Branch Administration should remove the specify code prior to adding the new specify code when storage card features are added or removed. Factory orders for processors that contain no additional storage features do not require a specify code.

Config. Number	Additional Storage	Required Specify Code	Total Additional Storage (MB)
1	None	None	0
2	6340(Qty 1)	9511	2
3	6340(Qty 2)	9512	4
4	6340(Qty 3)	9513	6
5	6340(Qty 1) 6341(Qty 1)	9512	6
6	6340(Qty 2) 6341(Qty 1)	9513	8
7	6340(Qty 1) 6341(Qty 2)	9513	10
8	6341(Qty 1)	9511	4
9	6341(Qty 2)	9512	8
10	6341(Qty 3)	9513	12

Notes:

- Total processor main storage in the Model G10 is the basic storage supplied 1,024KB.
- A 1MB storage card if used must be in position #1.
- Model J00 has a basic and maximum storage of 2,048 bytes located on the processor card.

**Specification Table:** The table below is provided to determine if 4965 Storage and Expansion Units or 4959 Input/Output Expansion Units are required to mount the desired features. Available feature positions within the processor unit are model-dependent and are expressed as a negative number for availability. A positive number is used for feature requirement. The test of a viable configuration is that the sum of the availability and requirement numbers cannot exceed zero. All features (#1XXX through #7XXX) may be field installed.

Machine/  
Feature/  
Number

Feature  
Positions Notes

4956-G10, H10 Processor

-6

	4956-J00 Processor	-7	
#1200	4993 Series/1 - System/370 Channel Attachment Feature	+1	(3)
#1205	4966 Diskette Magazine Unit Attachment	+1	(3)
#1215	4969 Magnetic Tape Subsystem Attachment	+1	(3)
#1220	4968 Autoload Streaming Magnetic Tape Unit Attachment	+1	(3)
#1300	Programmable Communication Controller	+2	(1,3)
#1310	Multifunction Attachment	+1	
#1400	Series/1 Local Communication Controller	+1	
#1560	Integrated Digital Input/Output Non-Isolated	+1	
#1565	Channel Repower	+1	(3)
#1610	Asynchronous Comm Single Line Control	+1	
#2074	Binary Synchronous Comm Single Line Control	+1	
#2075	Binary Synchronous Comm Single Line Control/HS	+1	
#2080	Synchronous Comm Single Line Control/HS	+1	
#2090	Synchronous Data Line Control	+1	
#2091	Asynchronous Comm 8-Line Control	+1	
#2092	Asynchronous Comm 4-Line Adapter	+1	(2)
#2093	Binary Synchronous Comm 8-Line Control	+1	
#2094	Binary Synchronous Comm 4-Line Adapter	+1	(2)
#2095	Feature-Programmable 8-Line Comm Control	+1	
#2096	Feature-Programmable 4-Line Comm Control	+1	(2)
#3580	4962 Disk Storage Unit Attachment	+1	(3)
#3581	4964 Diskette Unit Attachment	+1	(3)
#3585	4979 Display Station Attachment	+1	
#3590	4963 Disk Subsystem Attachment	+1	(3)
#3595	4967 High Performance Disk Subsystem Attachment, 2CA	+1	(3)
#3596	4967 High Performance Disk Subsystem Attachment, 3CA	+1	(3)
#4000	Series/1 To Personal Computer Channel Attachment Feature	+1	
#5620	4974 Printer Attachment	+1	
#5630	4973 Line Printer Attachment	+1	
#5640	Printer Attachment 5200 Series	+1	
#6305	4982 Sensor Input/Output Unit Attachment	+1	(3)
#6334	Storage Addition Card, 1MB	+1	(4)
#6340	Storage Addition Card, 2Mb	+1	(5)
#6341	Storage Addition Card, 4Mb	+1	(5)
#7840	Timers	+1	
#7850	Teletypewriter Adapter	+1	
#7880	Telephone Communication Controller	+1	
#7881	Telephone Communication Adapter	+1	(2)
RPQ D02038	4978 Display Station Attachment	+1	
RPQ D02118	GPB Adapter	+1	
RPQ D02793	Storage Upgrade MES 256KB/512KB	+1	(4)

Notes:

1. Must be contiguous I/O feature positions.
2. Must be contiguous I/O feature position with its associated controllers.
3. Not supported in the Stand-Alone Enclosure due to flat or internal cabling.
4. Not available for Model J00.

**Auxiliary Features/Cables/Connector Kits:** Certain devices, cables, etc., involved in system installations are available and may be ordered with this unit. For details, see section following Specification Table in M4959 pages.

MODEL CONVERSIONS

Model Upgrade	New Blackboard	New Processor	Remove Storage
G10 to			

## MACHINES

H10	Yes	Yes	No
G10 to			
J00	Yes	Yes	Yes
H10 to			
J00	Yes	Yes	Yes

The upgrade purchase price for model conversion is greater than the purchase price differentials. The customer should carefully evaluate future requirements when purchasing a system.

## ACCESSORIES

**Frame Stand (P/N 6841365):** Provides an attractive, steel stand capable of supporting a 4956 Model G10, H10 or J00 within Stand-Alone Enclosure (#4521) and a 4975 printer. The stand rests on glides and comes in a pebble gray color only.

## SUPPLIES

**Diskette:** The Models G10, H10 and J00 use the two-sided 5-1/4 inch diskette, ANSI compatible, soft sectored with high coercivity. IBM Part Number 6295022, 96 tracks per inch.

Model conversions are allowed. Consists of replacing the backboard and the existing processor with a new backboard and new processor. Upgrades to Model J00 require the storage to be removed also. The storage cards removed are the property of the customer. The removed backboard and removed processor become the property of IBM and must be returned to IBM. Field Installation: Yes. Customer price quotations and customer order acknowledgement letters for purchase model upgrades must state: "Installation of this model upgrade involves the removal of parts which become the property of IBM." Model downgrades are not recommended.

